



# *Service and Installation Manual*

**Model VO270EREV**


*Aerial Device*

**NA110018**

SERIAL NUMBER

**39025-02**

MANUAL PART NUMBER

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Time Manufacturing Co. 7601 Imperial Drive P.O. Box 20368 Waco, Texas 76702 Phone: 254-399-2100 Fax: 254-751-0775

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## OWNER'S WARRANTY

The **Versalift** Aerial Platform Lift is engineered and designed to perform as stated on published specifications. Only quality material and workmanship are used in the manufacture of this product. With proper installation, regular maintenance, and periodic repair service, the equipment will provide excellent service.

Those parts of the **Versalift** that are manufactured by **Time Manufacturing Company** are warranted for one full year from date of purchase. Structural components will carry a lifetime warranty for defects in material and workmanship which existed at the time of initial delivery, wear components are not covered by this statement. This warranty is issued only to the original purchaser and promises that **Time Manufacturing Company** manufactured products are free from defects in material and factory workmanship when properly installed, serviced, and operated under normal conditions, according to the manufacturer's instructions.

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## SECTION 100 INTRODUCTION

## INTRODUCTION

**NOTE:** As the aerial device users, you must read, understand, and follow the instructions in this manual and other manuals supplied with this aerial lift unit.

This manual is furnished with your **Versalift** aerial lift to provide practical and essential information required maintaining the performance and life of the **Versalift**. The scope of this manual includes maintenance inspection, service and installation information. Personnel responsible for maintaining, inspecting and servicing the aerial lift must be familiar with this manual and the operator's manual. A working knowledge of all the information included in both manuals is required.

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In addition to, dealers, owners, operators, renters, lessors and lessees are required to comply with the requirements of the applicable section or sections found in ANSI A92.2.

**NOTE:** For additional safety information and required responsibilities, refer to the accompanying **EMI Safety Manual and Manual of Responsibilities**.


Detailed information for the efficient operation of the **Versalift** aerial device can be found in the accompanying Operator's Manual.


**FREE EQUIPMENT.**

**NOTICE: THIS MANUAL IS A PERMANENT PART OF THE VERSALIFT AERIAL DEVICE AND MUST REMAIN WITH THE UNIT ALWAYS.**

**Time Manufacturing Company** reserves the right to improve the design or specifications any time without any obligation to incorporate new features into products previously sold.

To better understand this manual, it is important that the associated personnel be thoroughly familiar with the aerial lift. The following illustration identifies the major components of the aerial lift. These terms are used throughout the manual.

 **DANGER: THIS EQUIPMENT SHOULD BE OPERATED AND SERVICED ONLY BY COMPETENT PERSONNEL FAMILIAR WITH GOOD SAFETY PRACTICES. THIS INSTRUCTION IS WRITTEN FOR SUCH PERSONNEL AND IS NOT INTENDED AS A SUBSTITUTE FOR ADEQUATE TRAINING AND EXPERIENCE IN SAFE PROCEDURES FOR THIS TYPE OF EQUIPMENT.**

 **DANGER: READ AND UNDERSTAND THIS MANUAL BEFORE ATTEMPTING TO SERVICE THIS AERIAL EQUIPMENT.**

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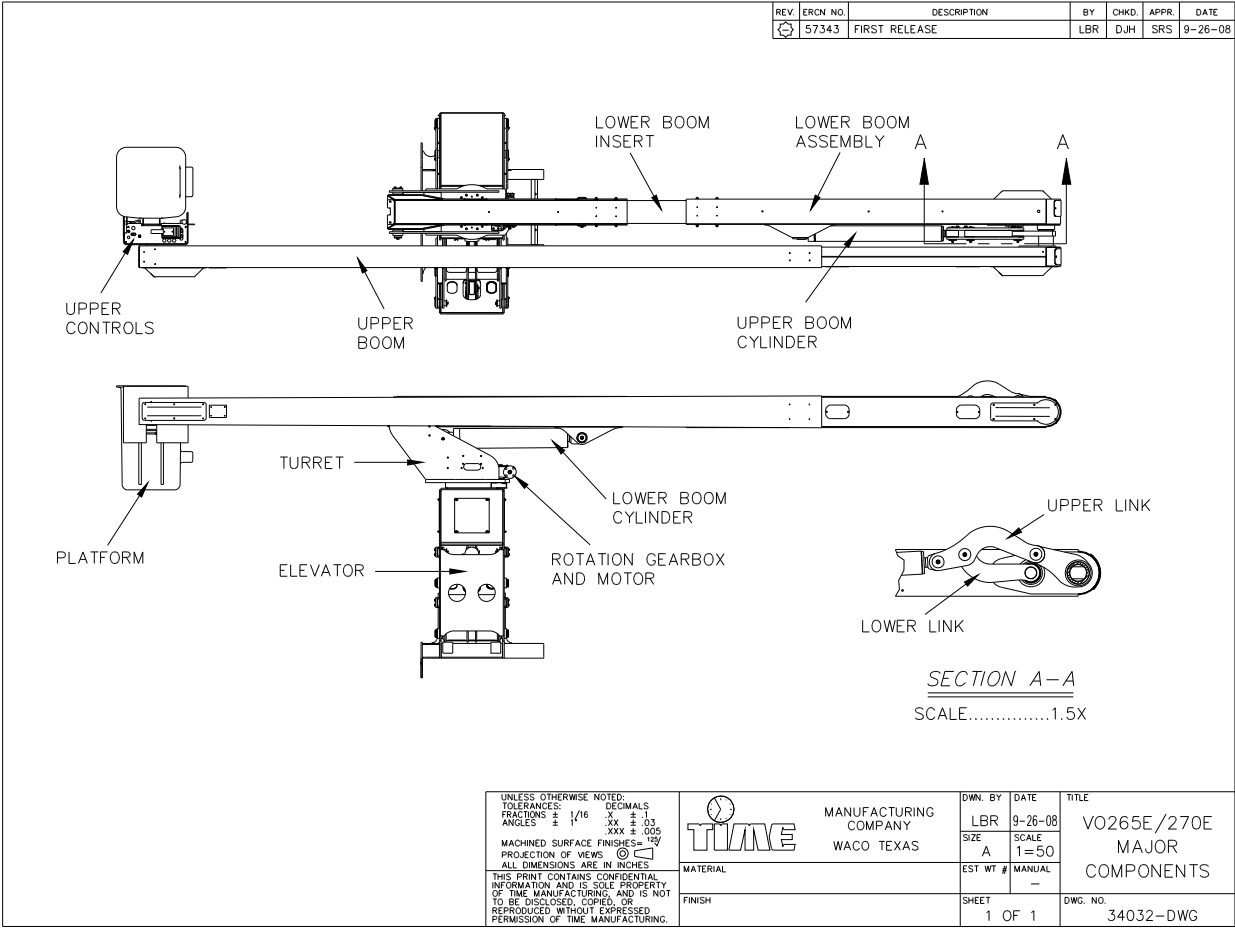


Figure 1 Model VO-265E/270E Nomenclature





## SECTION 101 SAFETY

# SAFETY

Throughout this manual there are danger and caution notes to warn of safety hazards while installing, maintaining, or servicing the **Versalift**. Any personnel performing these procedures should be aware of these concerns and responsibilities.

The prevention of accidents is dependent on good judgement and common sense on the part of the service personnel.

One hazard associated with installing or servicing this machine is lifting heavy objects. This is true whether the lifting is being done manually or mechanically. The weight, length, and other characteristics of the booms, pedestal, turret, and outriggers make it imperative that care be taken to balance and support them adequately when they are lifted. Care must be taken to balance these items and to keep personnel clear when lifting.

Never clean, oil, or adjust a machine while it is in motion. Special care must be used while the guards or protective covers are removed. The moving parts of the lift will cause crushing injuries if precautions are not taken. The guards and protective covers must be replaced as soon as the service work is complete.

Hydraulic oil is flammable so contact between hydraulic oil and sources of high heat or open flames must be avoided. Contact with hot hydraulic oil may cause serious burns which require immediate medical attention.

Failure to relieve pressure before disconnecting of the hydraulic hoses or fittings may result in a high pressure hydraulic oil spray. This spray or mist can puncture and become embedded beneath the skin or contaminate the eyes. Relieve pressure by activating the control valve while the hydraulic power source is off or disengaged. Loosen connections slowly to make certain pressure is relieved.

A stability test, per current ANSI A92.2 requirements, must be performed on the unit after it is mounted. This must be done before anyone operates the lift from the platform.

After servicing any portion of the hydraulic system, extend and retract all of the hydraulic cylinders several times to force any trapped air from the system. Never operate the lift from the platform until this has been accomplished.

Warning and instructional decals are installed at numerous locations on the aerial lift to warn personnel of the potential hazards during the use and operation of the **Versalift** aerial lift. If any decals are defaced, illegible, or lost they must be replaced immediately.

No manual can address every conceivable hazard while installing, maintaining, or servicing an aerial lift.

SAFETY

## **SECTION 102**

### **THEORY OF OPERATION**

# THEORY OF OPERATION

## MECHANICAL SYSTEM

Several mechanical systems are used in the operation of this aerial lift. They are described in detail below.

**OUTRIGGERS** - Two outriggers are provided as standard with this aerial lift. The outriggers consist of two rectangular tubes, one tube inside the other tube. The outer tube is attached to the pedestal. A double acting hydraulic cylinder is housed within each outrigger. This hydraulic cylinder is attached to the larger tube near the top and to the smaller tube near the bottom. When the hydraulic cylinder is retracted, the inner tube is wholly within the outer tube providing the necessary clearance from the ground and minimal width for road travel. As the hydraulic cylinder is extended, the inner tube telescopes down and away from the center of the aerial lift chassis. Sufficient extension is provided to allow the outriggers to contact the ground and elevate the chassis slightly. The outriggers increase vehicle resistance to overturning when the tipping point is moved further from the center of gravity.

**ROTATION** - The turret, lower boom, upper boom, and the platform of the aerial lift, rotate about the vertical centerline of the pedestal, supported by a shear-ball bearing. This bearing consists of two concentric rings. The inner ring is attached to the turret and has a groove around the outer diameter. The outer ring is attached to the pedestal and has a groove around the inner diameter. Spherical rollers or balls are positioned between the two rings in the grooves. The balls allow the rotation of the inner ring and the attachment components relative to the stationary outer ring. Motion is controlled by a hydraulic driven gear train. Gear teeth on the outside diameter of the outer bearing ring engage a drive gear supported on the turret. As the drive gear rotates, the turret rotates relative to the outer bearing ring. The drive gear is actuated by the hydraulic motor through a self-locking worm gear speed reducer. Smooth and controlled rotational movements of the turret, lower boom, upper boom, and platform are provided.

**LOWER BOOM** - The lower boom pivots about a horizontal centerline on the turret. A double-acting hydraulic cylinder attached to the turret and lower boom actuates the lower boom. With the cylinder fully retracted, the lower boom is horizontal. As the cylinder extends, the lower boom rotates to a raised position. At full extension, the hydraulic cylinder limits the maximum lower boom articulation to 35° past vertical.

**UPPER BOOM** - The upper boom pivots about a horizontal centerline at the knuckle. The linkage at the knuckle provides 270° (245° for the VO-260) of

upper boom articulation, relative to the lower boom. The linkage consists of an upper link and the pivot link. The upper boom unfolds as the upper cylinder is retracted.

**ELEVATOR** - The elevator assembly consists of a base structure, arms, knuckle, and a pedestal. These components are driven by 2 identical double-acting cylinders equipped with counterbalance valves. The arms articulate through a range of approximately 85° while providing a 10 ft (3.0 m) vertical lift. A link located in the knuckle connects between the upper and lower arm. This link synchronizes the arms and ensures that the pedestal only travels in the vertical direction.

**PLATFORM LEVELING** - The platform remains level, to the ground, through all boom movements. Fiberglass rods and #60 roller chain are interconnected to form a completely enclosed parallelogram system.

The lower rod and chain system rolls over the turret sprocket and over the idler assembly at the knuckle. The upper boom rod and chain system operates similarly in the upper boom. The fiberglass leveling rods maintain the insulation gap in all boom positions. The leveling system is adjusted by threaded rods which are easily accessed at the turret and the knuckle. The platform can be adjusted to level at the turret sprocket using the sprocket anchor bolt. Refer to the "Leveling System Assembly" illustration in Parts & Assemblies Section for leveling system components and their orientation.

## HYDRAULIC SYSTEM

The hydraulic schematics will aid in understanding the hydraulic system. Refer to "Hydraulic Schematics" Section for these schematics. Descriptions of the major components in the hydraulic system are given below.

**PUMP** - Open center systems are best described as constant flow systems. The open center hydraulic system with a fixed volume pump is standard on the VO unit. The PTO and pump configuration must be coupled to produce 2900 psi (205 kg/cm<sup>2</sup>) at 7 gpm (26 lpm).

**OIL RESERVOIR** - The hydraulic oil reservoir holds 25 gallons (94.6 l) in reverse mount unit and 17 gallons (64.3 l) in the rear mount unit. Oil is drawn out, and returned to the bottom of the reservoir, through pipes which extend from a few inches above the bottom of the tank to above the oil level in the tank. This prevents entrainment of air in the hydraulic oil and allows filter to be changed without draining the reservoir. The reservoir also includes a baffle to minimize the

entrainment of air in the oil.

**FILTRATION** - The 10 micron return line filter is located on the top of the hydraulic oil reservoir and includes an indicator to show when excessive pressure is required to force the oil through the filter. With a closed center system, a function or tool must be actuated to check the filter indicator. A 100 mesh (149 micron) suction screen is located in the reservoir and can be removed and cleaned. Oil leaves the tank, passing through the suction strainer on the way to the hydraulic pump. All of the oil passes through the return line filter on its way to the tank.

**GROUND CONTROLS** - The ground controls consist of a selector valve, four-way control valves, and optional controls for engaging a tool circuit on the ground or shutoff valves as explained later.

The selector valve consists of a two-position spool valve that directs hydraulic oil flow either to the lift or to the remaining ground controls.

The outrigger controls consist of two, four-way control valves connected in a series. A relief valve is integral to these control valves. Hydraulic oil is directed to either end of a double-acting hydraulic cylinder that extends or retracts the outriggers.

A lock valve or double pilot operated check valve is mounted on each outrigger cylinder, effectively blocking the flow out of both ends. When the four-way control valve is actuated, pressure is applied to one end of the cylinder and to a pilot piston that opens the check valve allowing flow out of the other end. Flow now extends or retracts the outrigger cylinder as desired. A thermal relief is incorporated into the lock valve. The thermal relief valve allows excessive pressure created by thermal expansion to bypass the check valve. As a result the check valve traps oil in the rod end of the outrigger cylinder.

On reverse mount units an additional four-way control valve is used for dump body control. A shutoff or needle valve is included to prevent inadvertent operation of the dump body. As an option, they can be installed on the outrigger circuit for the same purpose, as well as, additional protection against the outriggers retracting under load. This valve must be manually opened or closed.

The optional tool circuit control consists of one two position selector valve. Hydraulic tools can be operated when the ground controls are engaged and the tool selector is actuated.

When the ground controls are selected, oil circulates

through the control valves and back to the reservoir because they are open center valves. This allows warming of the hydraulic oil in cold weather.

**ROTARY JOINT** - A rotary joint, mounted between the turret and the pedestal, allows for continuous rotation. A cylindrical case, which houses a spool, is bolted to the turret and the spool is fastened to the pedestal. The turret and the case rotate about the spool which remains stationary.

Oil from the pump enters port 2 of the spool, flows up a drilled passage in the spool, and into a groove which completely encircles the surface of the spool. Oil flows along the groove until it comes to the outlet port 2 in the case, wherever it is at that particular time. Because the case outlet moves along the groove as the lift rotates, oil flows out of the case port uninterrupted. Return oil flows through port 1 or 3 of the case, along the groove in contact with port 1 or 3, and then out port 1 and 3 of the spool on its way back to the oil reservoir. Since all of the relative motion takes place between the spool and the case, continuous rotation is possible.

**SYSTEM PRESSURE RELIEF** - The relief valve is located in the pressure line, between the pump and the lift/ground control selector valve. The relief valve prevents the hydraulic system from developing excessive pressure.

**UPPER FUNCTION CONTROLS/TOOL POWER** - The three, four-way spools connected internally in a parallel circuit, have priority over the tool section: The upper controls can be operated simultaneously. Only open center tools can be used with the open center hydraulic system. The emergency stop/tool hookup valve dumps flow to the tank for easy tool hookup or removal. Each boom function at the upper controls incorporates either locking handles (individual controls) or a safety trigger (single stick control). The locking handles and safety trigger are designed to eliminate inadvertent operation of the upper control valve. The upper controls can be operated simultaneously.

On Category B and C units 50 ft. and above, a vacuum prevention system is installed on the upper controls. This system prevents a vacuum from forming in any hydraulic line that crosses the insulated portion of the boom, since oil vacuum may reduce dielectric strength.

**LOWER CONTROLS** - The lower controls are located on the panel of the lower deck. When the control selector is positioned to provide flow to the lift, the lower controls are operational.

The platform override control is the first section of the control valve. When this control is selected oil is diverted either to the upper controls or allowed to flow to the second, third, and fourth sections which control the lower boom, upper boom, and rotation functions respectively. Oil is available to these sections only when the lower controls are selected.

**UPPER AND LOWER BOOM CYLINDERS AND HOLDING VALVES** - When the valve controlling the oil flow to the upper and lower boom cylinders is actuated, the oil leaves the control valve assembly and flows to the holding valve. As the oil is directed to the cylinders, it enters three passages. One passage is blocked by a piston, which is spring-loaded against its seat. The incoming oil is on the same side as the spring. This causes the piston to be pressed tighter against its seat, effectively blocking this passage. The oil then flows through the other passage which has a spring-loaded check valve in it. The oil pushes the check valve off its seat, flows out of the holding valve, and into the hydraulic cylinder.

The hydraulic cylinders are double-acting, meaning both ends of the cylinders contain oil. In order for the incoming oil to move the cylinder pistons, oil on the other side of the cylinder pistons must be able to escape from the hydraulic cylinders. The oil cannot escape because the other holding valve is blocking it. The passages in this holding valve are identical to the ones described above. However, the oil is trying to flow through the passages in the opposite direction. The oil meets the piston and the check valve again, both identical to those in the holding valve. However, the oil is on the back side of them now. It is on the same side of the check valve as its spring. The combination of the oil pressure and the spring holding the check valve on its seat, effectively blocks this passage. The oil also pushes against the back side of the piston, the side opposite the spring. The oil tries to push the piston off its seat by compressing the spring. Normally, the load induced pressure of the trapped oil is not sufficient to overpower the spring and push the piston off its seat. Thus, the oil remains trapped. This is what produces the holding action which prevents the booms from creeping down or free falling should hydraulic lines be damaged.

To release this trapped oil, hydraulic oil pressure must be applied to the pilot piston to push it off its seat. This pilot pressure is obtained from the third passage for incoming oil. The combination of the pilot pressure and the trapped oil pressure overpowers the spring, pushes the piston off its seat, and allows a controlled flow of oil out of the cylinders returning to the control valve and back into the reservoir.

As mentioned before, normal load induced pressures are not adequate to overpower the spring that acts on the piston. However, excessively high pressures such as those generated from the thermal expansion of the oil will open the piston sufficiently to relieve this potentially damaging pressure.

**OUTRIGGERS** - Each outrigger has its own control valve, lock valve and hydraulic cylinder. Each component is described in detail below.

**Control Valve** - The reverse mount unit has two, four-way control valves connected in series for the outrigger controls.

**Selector Valve** - The control selector valve consists of a two-position spool valve mounted on the ground control panel. The purpose of the selector valve is to select between ground controls and lift controls. In the out position, oil is directed to the outriggers, dump body, and the tool controls. When activated (pushed in) oil is directed to the aerial lift.

**Shut-Off Valve** - The shut-off valve is a needle and seat type valve designed for general purpose restriction of hydraulic circuits. This valve must be manually opened and closed. When used, it prevents unintentional operation of the dump body control.

**Lock Valve** - The lock valve is designed to lock the outrigger cylinder in position, without leakage, while the control valve is in the neutral position. This valve functions as a check valve, allowing flow to the cylinder and blocking reverse flow until pilot pressure is applied to unlock the circuit. The lock valve is located inside the outrigger housings close to the outrigger cylinder.

**Outrigger Cylinder** - The hydraulic cylinder is located inside the outrigger housing and is double-acting.

**Operation** - When the outrigger controls are selected, oil flows from the main hydraulic line through the outrigger control valves. Shifting the control valve spool directs oil flow to the lock valve located inside the outrigger tubing. Oil enters the lock valve, pushes a spring loaded check off its seat, flows out of the lock valve, and into the outrigger hydraulic cylinder. Oil trying to escape from the other side is blocked by a check valve in the return side of the holding valve. This check valve keeps the circuit locked until adequate pilot pressure is produced on the pressure side of the lock valve to unseat the check valve. The pilot oil pressure moves a pilot piston which pushes the check valve off its seat. The return oil then flows out of the lock valve to the control valve allowing the outrigger to move.

## ELECTRICAL SYSTEM

The electrical schematics will aid in understanding the electrical system. Refer to the specific option schematics. Descriptions of the major components in the electrical system are given below.

### MASTER CONTROL COMPONENTS

**Truck Ignition Switch** - The current used when operating the start/stop control comes from the truck ignition system. The key must be in the ignition and turned to the "on" position before current is available to operate the electrical system.

**Toggle Switch** - The single-pole, two-position toggle switch is mounted on the truck dash board.

**Red Dash Light** - The red 12 volt dash light indicates when the master control system is activated.

### OPERATION THEORY OF THE MASTER CONTROL

The master control option provides a toggle switch on the truck dash to energize and de-energize the start/stop system.

With the master control toggle switch activated and the ignition switch in the "on" position, current flows from the ignition switch through a 20 amp fuse to terminal 2 on the toggle switch. Through the toggle switch current flows from terminal 2 to terminal 3. From terminal 3 on the toggle switch, current flows to terminal 7 on the terminal block, located in the ELECTRICAL BOX ASSEMBLY. In addition, current flows from terminal 3 on the toggle switch to the dash light. The dash light will illuminate as current flows through it to a ground.

With the master control toggle switch deactivated, there is no electrical current flow to the dash light or terminal 7, on the terminal block. The truck ignition system will function normally.

## OPTIONS

### START/STOP CONTROL COMPONENTS

The electrical schematic will aid in understanding the start/stop control electrical system. Refer to the specific option schematics. The electrical components and their functions are described in detail below.

**Dash Push Button Control** - This is a spring-loaded, push button control that can be used by ground personnel to start or stop the truck engine when the master control system is on.

**Start Relay** - The 12 volt, single-pole, start relay is mounted in the electrical box and is normally in the open position. When activated, the start relay forms a connection from the truck battery to the truck starter solenoid.

**Stop Relay** - The single-pole stop relay is mounted in the truck engine compartment and is normally in the closed position. When the stop relay is activated the ignition circuit and the start relay control circuit are broken and the engine stops.

**Ignition Relay** - The 12 volt, double-pole, double-throw, latching ignition relay is mounted in the electrical box. One set of points is in the start circuit and the other set of points is in the ignition circuit.

**Pressure Switch and Air Cylinder** - The pressure switch is mounted on the turret wing and connected, by an air line, to an air cylinder mounted on the platform control panel. When the air cylinder is operated, air pressure is produced and the electrical contacts in the pressure switch close. The truck engine is started or stopped depending on the position of the ignition relay contacts.

**Panel Toggle Switch** - A single-pole, three position, momentary toggle switch is mounted on the panel of the lower deck. The truck engine is started or stopped depending on the position of the toggle switch.

### OPERATION THEORY OF START/STOP CIRCUITS

**Start/Stop Circuit** - When the master control toggle switch is activated and the ignition switch is in the "on" position, current flows to terminal 7 on the terminal block. Current from terminal 7 flows to the ignition relay. The ignition relay supplies current to the start or stop relay depending upon the latching position. The latching position is toggled between the start and stop position each time one of the start/stop switches is operated.

In order for the start system to operate, the ignition relay must be latched in the start position and one of the start/stop switches must be held in the start position. With the start relay energized, current from the battery flows to the starter solenoid.

To activate the stop system, the ignition relay must be latched in its stop position and one of the start/stop switches must be held in the stop position. With the stop relay energized, the ignition circuit and the start relay control circuit are broken and the engine stops.

## EMERGENCY POWER

The electrical schematic will aid in understanding the emergency power electrical system. Refer to the specific option schematics. The electrical components and their functions are described in detail below.

**Motor** - The motor is a 12 volt DC motor and is used to operate an auxiliary hydraulic pump in the event that the main pump cannot be used. Power to operate the motor is obtained from the truck battery.

**Solenoid** - The solenoid is mounted on the motor and is used to complete the circuit between the truck battery and the motor. The control coil of the solenoid does not have an internal ground for completion of the control circuit. Ground connection is controlled by a control in the platform.

**Pressure Switch And Air Cylinder** - The air cylinder and pressure switch are identical to the ones used for the start/stop system. Refer to the start/stop system theory for a description of how they work. Operation of these two components completes the solenoid control circuit.

**Toggle Switch** - The single-pole, two-position, maintained toggle switch is mounted on the lower control cover. The emergency power solenoid is energized or de-energized depending on the position of the toggle switch.

## OPERATION

**Control Circuit** - Power for the control circuit comes from the "on" terminal of the ignition switch. This means that the key must be in the ignition and turned "on" before the system will operate. Current flow is from the "on" terminal of the ignition switch, through the solenoid coil, and through the pressure switch to the ground.

## MANUAL THROTTLE CONTROL ELECTRICAL THEORY

The throttle control electrical schematic in this section will aid in the understanding the electrical system. The manual throttle control components and their functions are described in detail below.

**Truck Ignition Switch** - All current used for operating the throttle control system comes from the truck ignition switch.

**Throttle Control Relay** - This relay is a 12 volt, double pole, double throw, latching relay which is mounted in the electrical box.

**Pressure Switch And Air Cylinder** - The pressure switch is mounted on the turret wing and the air cylinder is mounted on the platform control panel. A small air line connects the two components together. When the air cylinder is operated, air in the line is compressed. When adequate air pressure is produced, the electrical contacts in the pressure switch close and the electrical solenoid on the engine is activated or deactivated, depending on the position of the latching relay.

**Toggle Switch** - The single-pole, three-position, maintained toggle switch is mounted on the panel of the lower deck. The throttle control relay is energized when the toggle switch is operated in either direction.

**Throttle Actuator** - The throttle actuator is mounted in the engine compartment. It is activated by an electrical signal from the throttle control latching relay. Gas and diesel engine models use an electrical solenoid actuator.

## OUTRIGGER/BOOM INTERLOCK ELECTRICAL/HYDRAULIC THEORY

The outrigger/boom interlock option is a safety feature designed to prevent the lift from being operated until the outriggers are properly extended. The interlock also prevents the outriggers from being retracted before the lift is properly stored. Refer to the "Outrigger/Boom Interlock Installation" in Parts & Assemblies Section. The outrigger/boom interlock components and their functions are described below.

**Outrigger Limit Switch** - This switch is mounted near the upper cylinder pin of each outrigger. When the outrigger contacts the ground, the upper pin moves upward, actuating the switch.

**Toggle Switch** - This switch is located near the outrigger control valves. It is used to select between lift controls and outrigger controls, provided the interlock requirements are met.

**Lower Boom Limit Switch** - This switch is mounted at the lower boom rest to indicate the position of the lower boom. The switch is open when the boom is stored.

**Solenoid Valve** - This valve directs the hydraulic flow from the pump to either the lift controls or the outrigger controls. When the solenoid is energized, hydraulic flow is directed to the lift controls.

**Override Switch (Not Included)** - If required, this switch may be installed as shown in the schematic. It allows the interlock to be temporarily defeated.

Continuous actuation is required to accomplish this condition. As an example, a reverse mount unit with a dump body requires that the booms be raised to dump the body.

## OPERATION

The outrigger/boom interlock system operates by energizing or de-energizing the solenoid valve.

There are two circuits that can energize the solenoid. One circuit is through the lower boom limit switch and the other circuit is through the outrigger limit switches and toggle switch.

With the lower boom stored and the outriggers retracted, the lower boom limit switch is open and both outrigger limit switches are open. Therefore both circuits to the solenoid are open and the solenoid is de-energized. With the solenoid de-energized, the hydraulic flow is directed to the outrigger controls. Note that under these conditions the toggle switch has no effect on the solenoid. This system prevents operating the lift without extending the outriggers. When the outriggers are extended to ground, the outrigger limit switches close and the circuit to the toggle switch is completed.

If the toggle switch is open, the solenoid remains inactive. Closing the toggle switch energizes the solenoid, thereby directing hydraulic flow to the lift controls.

Raising the lower boom off the boom rest closes the lower boom limit switch. This completes a second circuit to the solenoid.

If the toggle switch is now opened or if one outrigger raises off the ground, the solenoid valve remains energized through the lower boom limit switch. Therefore, hydraulic flow remains directed to the lift controls.

If the optional override switch is installed, the solenoid can be de-energized by opening the switch. This directs hydraulic flow to the outrigger controls regardless of the other system conditions.

## SINGLE-STICK UPPER CONTROL

**Upper Controls** - The single-stick controls consists of three 4-way spools connected internally in a parallel circuit. The tool selector and safety trigger are on the first selection of the four section control valve. With the safety trigger in neutral, system oil is available to the hydraulic tools. Activating the safety trigger directs oil to the lift functions and prevents flow to the tool

circuit. To vent the tool line for hook up or removal; use the tool power valve. This two-position valve functions as a dump valve.

On Category B and C units 50 ft. and taller, a vacuum prevention system is installed on the upper controls. This system prevents a vacuum from forming in any hydraulic lines that crosses the insulated portion of the boom, since oil-vacuum may result in reduction in dielectric strength.



## **SECTION 103 SERVICE PROCEDURES**

**SERVICE PROCEDURES**

# SERVICE PROCEDURES

## MAINTENANCE AND INSPECTION

The maintenance and inspection of certain items are the responsibility of a competent operator. Being alert for evidence of a problem is essential in providing satisfactory service. The items deserving daily attention are given in the operator's manual. Included are general visual inspection guidelines, lubrication instructions, hydraulic oil and filter maintenance, and field adjustments. Any failure or malfunction should be reported to authorized service personnel for corrective action.

Reliable and economical service will be achieved if a rigid preventive maintenance and inspection schedule is performed by authorized service personnel. Follow the preventive maintenance and inspection schedule provided in this manual. The time intervals given are those recommended for anticipated operating conditions. These time intervals must be adjusted to specific user conditions. When a malfunction or abuse of an aerial lift has occurred, service and maintenance of the lift must be administered before further use.

If a defect is found during scheduled inspections or routine operation, repair or adjust the unit before operation. Injury to personnel and further deterioration of the aerial lift may result if the aerial lift is operated while a defect exists.

The Maintenance and Inspection Checklist/Record is provided at the end of this section for the items listed below.

Access covers and protective guards must be removed from the aerial lift before the inspection procedure. Once the procedure is complete, install all covers and guards, replacing any that are damaged beyond repair. Covers and guards are designed to protect personnel and prevent foreign material from corrupting components.

### PRIOR TO PLACING UNIT INTO SERVICE.

#### 1. MAINTENANCE

- A. Perform the Daily Visual Maintenance and Inspection Checks (refer to Operator's Manual).
- B. Rotation bearing deflection check (new bearing initial tilt measurement).

The rotation bearing is designed and manufactured with tightly controlled internal clearance to provide smooth rotation at low torque requirement without excessive looseness between the inner and outer rings. The bearing clearance will increase slightly during the initial


run-in period, but should then remain essentially constant for many years if the bearing raceway starts to wear out, the clearance will begin to increase, steadily at first and accelerating toward the end of the bearing life. This may be noticed as a marked increase in the tilting or rocking of the turret with respect to the pedestal top plate during load reversals. Other factors will be present in a bearing that is wearing excessively i.e. roughness or noise in the rotation bearing.

Measurement of the turret tilt under load reversal using a magnetic base dial indicator is a good means of determining the bearing condition.

Perform this initial tilt measurement check when the unit is delivered. This will provide a baseline for future bearing tilt measurements. Future bearing tilt measurements will be compared to this baseline to determine how much the bearing tilt has increased since the initial (new bearing) measurement.

### **Rotation Bearing Deflection Check**

1. With rated load in the platform, position the unit on a level suitable working area. Apply the parking brakes and chock the wheels, engage the PTO and properly set the outrigger/stabilizers if equipped.

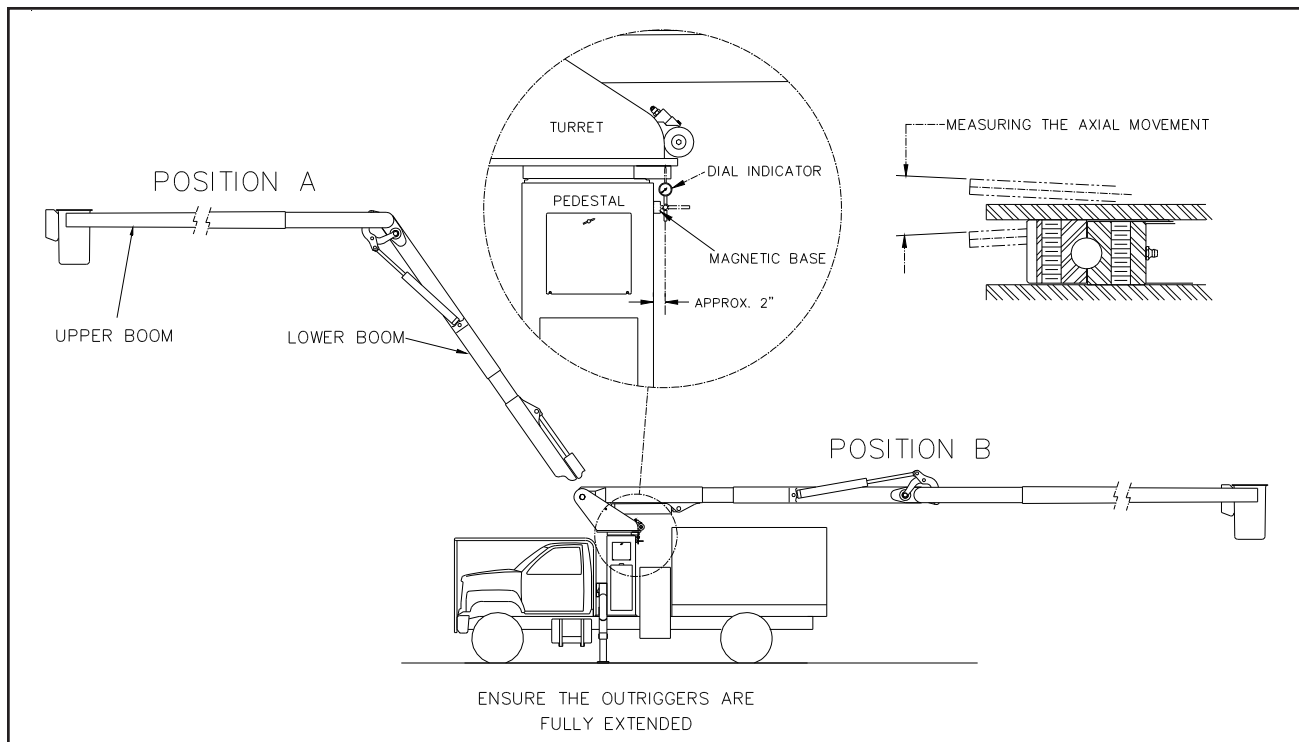
 **DANGER: NEVER OPERATE WITHOUT EXTENDING THE OUTRIGGERS (IF EQUIPPED). WITHOUT PROPER OUTRIGGER EXTENSION, THE UNIT MAY TIP RESULTING IN DEATH OR SERIOUS INJURY.**

2. Rotate the turret to the position to be used for the tilt measurement. Position the aerial device over the working side of the vehicle. For consistent measurement, always use the same rotational position each time the tilt measurement is done. Record the rotational position in the maintenance log.
3. Position the booms in Position A as shown on "Boom Position Diagram" Figure 1.
4. Attach the magnetic base of the dial indicator to the pedestal and the pointer of the indicator positioned against the under side of the turret base plate as close as possible to the bearing gear cover. Figure 2 shows three recommended positions for the dial indicator pointer. Once the a correct indicator pointer position is chosen, it is very important that the same

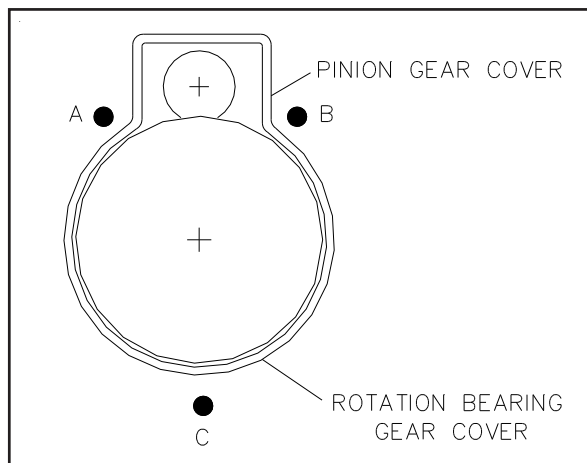
pointer position is used for each subsequent tilt measurement. Therefore record the pointer position in the maintenance or log where the tilt measurements are recorded. Some inspectors prefer to permanently mark the location where the dial indicator pointer contacts the bearing base plate to ensure that subsequent measurements are made in the exactly the same spot.

4. Set the dial indicator at zero with booms in Position A.
5. Slowly position the booms to Position B. Do not rotate the turret. Record the indicator reading.
6. Repeat steps 4 and 5 to obtain an accurate reading.
7. When an increase in turret tilt of 0.065" (1.65 mm) above the initial tilt measurement or a total axial movement exceeding .125" (3.17 mm), it is generally an indication ball and ball path deterioration is occurring. It is recommended the **bearing be replaced at this time**. Refer to "Rotation Bearing Replacement Criteria" in this section for other factors related to the conditions of the rotation bearing.

**NOTE:** *The axial movement can be monitored and if no increase in axial movement occurs the rotation bearing can be left in service.*



**Boom Position Diagram**  
**Figure 1**



**Dial Indicator Position**  
**Figure 2**

### 30 DAYS OR 85 PTO HOURS AFTER "IN SERVICE" DATE (ONE-TIME SERVICE).

#### 1. MAINTENANCE

- A. Any hydraulic system must be maintained to provide reliable performance. The return flow filter should be replaced after the first 30 days of operation and every 6 months thereafter. Whenever the filter is changed, the oil should be examined for foreign particles or water. If contamination is found, the oil should be changed or reclaimed.

### 3 MONTHS OR 250 PTO HOURS AFTER "IN SERVICE" DATE (ONE-TIME SERVICE)

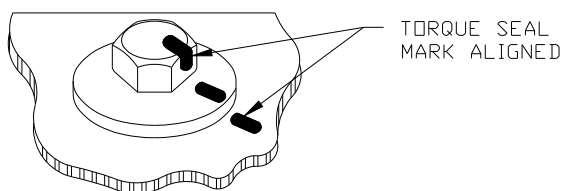
#### 1. MAINTENANCE

##### NOTES:

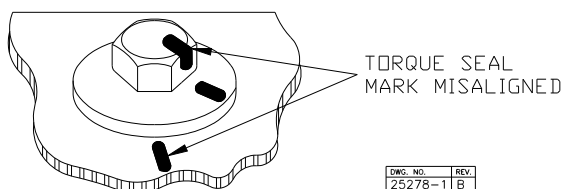
- A. **Re-torque all load supporting bolts; Rotation bearing bolts, Pedestal/Subframe mounting bolts, Platform rotator bolts. A new torque seal mark must be installed.**
- B. **All other critical fasteners must be visually inspected for rotation and signs of failure.**

Prevailing torque nuts are used in structural applications to prevent loosening from vibration. To be effective, 2 threads must protrude beyond the locknut once tightened. Only install unused locknuts and bolts.

Torque seal marks are used on critical fasteners. This procedure provides a means for quick visual inspection of fastener condition. Do not use the lift if the Torque-Seal mark between the bolt head and mounting surface, are not in alignment.



**Torque Seal Mark In Acceptable Condition**



**Torque Seal Mark In Misalignment Condition**  
**Figure 3**

### 3 MONTHS OR 250 PTO HOURS MAINTENANCE AND INSPECTION (AFTER THE INITIAL ONE-TIME SERVICE)

#### 1. GENERAL INSPECTION

- A. Remove any accumulated trash or debris from inside booms, around turret and pedestal, and in area of the controls.

Inspect the unit for physical wear or damage including the following items.

- B. Check control handles and actuators for binding. Two way controls valves should return to center position. Use spray lubricant to free sticky valves.
- C. Check for interference between moving components, particularly around the turret and knuckle area. Evidence of interference may appear as bent or scratched components. Replace or repair any damaged components.
- D. Hydraulic hoses should be inspected for separated or frayed jackets, especially at the turret, knuckle, and from the boom tip to the platform. If the protective sleeve has been damaged, examine the hoses closely in that area. Replace the hoses if damaged and replace sleeves that are damaged and do not protect the hoses.
- E. Inspect electrical system for damaged components. Check for bare electrical wires and remove any trash or debris from around electrical components. Repair all damaged wires and secure any loose electrical components or wires.
- F. Inspect and replace any identification, operational, or instructional decals that are lost, damaged, or illegible.
- G. Verify that the upper boom tie down strap and rubber pad are in place and adjust if necessary. Failure to use tie down strap can damage the upper boom structurally.

#### 2. STRUCTURAL INSPECTION

Verify structural integrity of the aerial lift. Certain structural components of the aerial lift are deemed critical. These items must be inspected for any signs of degradation or impending failure. Any suspect item should be further inspected using an acceptable non-destructive test procedure such as magnetic particle or dye penetrant.

- A. Any fastener that is structural or retains a structural member is considered critical and is shown in the "Critical Fasteners" drawing included in this section. These fasteners must be visually checked for rotation and signs of failure. Do not use the lift if a torque-seal mark is not aligned. If any loose fasteners are found, both the nut and bolt **must be replaced and tightened to the proper torque**. Nuts and bolts, must never be reused. A new torque-seal mark must be installed. Refer to "Maintenance & Inspection Schedule" in this section.

- B. Critical welds are shown on the "Critical Welds" drawing included in this section. Any defective structural welds must be repaired in accordance with ANSI A92.2 requirements. Consult factory for material specifications and proper welding specifications.

- C. Inspect all structural components and replace if corrosion or deformation is present.

All fiberglass components and the fiberglass to steel epoxy bonded joint are considered critical. These components and joints must be repaired or replaced before further use.

- D. Check the leveling system for looseness, wear, damaged leveling rods, or improper action of roller chain over the sprockets. Clear any trash or debris from around sprockets and replace damaged components. Refer to next paragraph for adjustment or installation procedures.

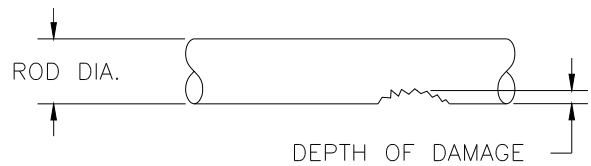
The pretension in the leveling system should be checked periodically. To clarify these instructions see the "Leveling System Assembly" drawing in Parts & Assemblies Section. Adjust the tension by tightening the nut until there is no visible droop of the leveling rods through the booms, torque not to exceed 13 ft/lbs (17.6 N-m). This adjustment is made through the turret end of the lower boom and through the knuckle end of the upper boom. If it is necessary to remove links from the leveling system in either the upper or lower boom, always remove them from the chains at the knuckle.

Inspect the fiberglass leveling rods which are epoxy bonded to the rod ends. Inspect epoxy bonds for cracks or signs of movement between the bonded components. Refer to leveling rod inspection criteria below.

#### Fiberglass Rod Damage

Leveling rods with minor damage may be left in service without repair if the depth of the damage

is less than shown below. If there is any doubt as to the extent of damage, replace the rod assembly.



Rod Diameter  
3/8"  
5/8", 3/4"

Depth Of Damage  
.125" MAX  
.19" MAX

#### Leveling Rod Ends

Rod ends are swaged and bonded to the fiberglass rod. The fiberglass rod is painted to indicate movement. Check for movement between the rod and rod end by looking for an unpainted area next to the rod end. If there is any evidence of movement, replace the rod assembly.



- E. Inspect the insulating fiberglass upper and lower boom insert for cracks, nicks, or evidence of fatigue. Damage to fiberglass components not only affects the structural integrity but also degrades the insulating property. For additional information refer "Care of Fiberglass Booms" in this section. Inspect the fiberglass to steel epoxy bonded joints located at both ends of the lower boom insert and at the knuckle end of the fiberglass boom. Inspect Jib pole for any signs of cracks, nicks, or evidence of fatigue. Damage to the pole will affect the structural integrity.
- F. Inspect the platform for cracks in the mounting ribs, floor, and flange around the top. Repair any cracks or replace the platform, if required. The first step in successful platform repair is to analyze the damage and determine the cause. Cracks in the gelcoat or outer surface of the platform are easily repaired. Damage to the fiberglass structure can be more serious and should be carefully evaluated before attempting to repair the platform. If the top lip, mounting flange or the bottom of the platform is damaged, repair should not be attempted.

#### 3. OPERATIONAL CHECKS

Perform operational checks on the following items.

- A. If so equipped, verify proper engagement of the PTO without excessive noise or vibration during operation. Refer to the PTO manufacturer installation manual if adjustment is necessary.

Verify the hydraulic pump is functioning properly without excessive noise, vibration, or overheating. Noise in a hydraulic pump can indicate cavitation or the intake of air into the suction line. This could result from a low level of oil, loose suction line fitting or operating in temperatures too cold for the type of oil used.

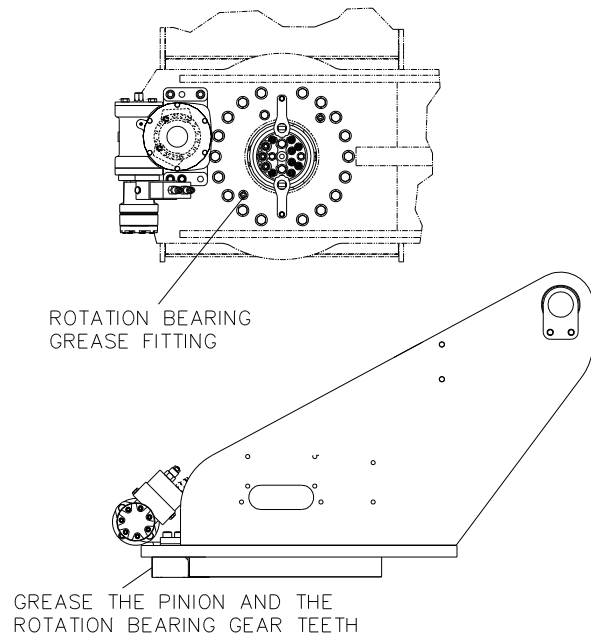
If overheating occurs, check the main system relief pressure as described in "Adjustments" in this section.

- B. Verify that the lift functions according to the control instructions. Consider all hydraulic and electrical control systems including optional equipment and audible or visual warning systems. Refer to "Boom Actuation Speeds" in this section, to verify the boom function speeds. Adjust the pump flow by varying engine speed as required.
- C. Verify the holding valves are functioning properly, per instructions in "Adjustments" section.
- D. Check clearances between moving components during operation. Observe the knuckle and turret areas through the complete range of motion with a load in the platform. In particular, observe the pivot link, main links, and upper and lower booms at the knuckle. Repair, replace, or adjust components to maintain clearance.
- E. Observe the leveling system during operation. Platform leveling should be smooth during boom actuation with minimal looseness or free play. Verify that roller chain is free to flex and determine that all connector link components are in place. Check tension and adjust according to the instructions given on the "Leveling System Assembly" option drawing. If required, remove links in the chain at the knuckle.
- F. Inspect unit for hydraulic system leakage including all hydraulic components, hoses, and fittings. Replace leaking hoses or fittings with parts meeting or exceeding manufacturer specifications.
- G. With hydraulic cylinders fully extended, look at the cylinders for rough or nicked cylinder rods. Refer to hydraulic cylinder repair for inspection procedures.

#### 4. MAINTENANCE

- A. Rotation Bearing - Lubricate the rotation bearing, using the two zerks located inside the turret, as shown in Figure 4. Apply grease at 90° intervals to help distribute the grease more consistently.
- B. Rotation Bearing/Pinion Gear Teeth - Remove the pinion gear cover and apply a waterproof gear grease such as Lubriplate's "Gear Shield Heavy" to the gear teeth, as shown in Figure 4. Rotate the aerial lift to allow a grease application around the entire gear. This can be done while lubricating the rotation bearing as explained in Item A.

**⚠ WARNING: KEEP CLEAR OF THE GEARS WHILE ROTATING THE AERIAL LIFT AND ALWAYS REINSTALL THE COVERS AFTER COMPLETING THE LUBRICATION. ANYTHING CAUGHT BETWEEN THE GEARS WILL BE CRUSHED.**



**Lubrication Points  
Figure 4**

- C. Purge any moisture accumulation from air lines. Disconnect both ends of air line and force dry air through them until no moisture is discharged. If unused air lines are present, purge them as well.

#### 6 MONTH OR 500 PTO HOURS MAINTENANCE AND INSPECTION

##### 1. INSPECTION

- A. Inspect hydraulic oil for contamination. If the hydraulic oil is cloudy or dirty, drain and replace it. Refer to "Hydraulic Oil Recommendation" information in this section to determine which type of hydraulic oil to use.
- B. Inspect slope indicators for true adjustments.

## 2. MAINTENANCE


- A. Check the hydraulic system return line filter by reading the indicator gage on the side of the pedestal. If the gage reads in the red area, change the filter.
- B. Clean any accumulation of foreign material from the suction strainer and the magnetic drain plug if oil shows signs of contamination.

**Suction Strainer** - The 100 mesh (149 micron) suction strainer must be removed and cleaned periodically. To remove, drain the reservoir, unscrew the suction strainer at the bottom of the tank. Remove, clean, and reinstall the suction strainer. Pump cavitation is often caused by a dirty or clogged suction strainer. Operating in conditions too cold for the type of oil is another common cause for pump cavitation. Noisy pump operation is a strong indicator of pump cavitation.


When the **return line filter** and **suction strainer** are changed or cleaned the oil should be examined for foreign particles and water. If contamination is found, the oil must be changed or reclaimed by adequate filtering.

- C. Verify settings of main system relief pressure and system operating pressure. Refer to next paragraph for adjustment procedures if necessary.

**Main System Relief Pressure** - The main system pressure relief valve is located in the pressure line between the pump and the lift/ground control selector valve. The relief valve prevents the hydraulic system from developing excessive pressure. Before attempting to adjust the main system relief pressure, check and adjust the system operating pressure if necessary. To adjust the system relief valve, loosen the locknut and turn the adjustment screw counterclockwise until a hissing is heard, indicating oil flow. Then slowly turn the adjustment screw clockwise until the hissing stops. Continue turning the adjustment screw clockwise for one complete rotation after the hissing stops. Retighten the locknuts to complete the adjustment.

 **CAUTION: NEVER SET SYSTEM OPERATING PRESSURE ABOVE THE RECOMMENDED SETTING OF 2900 PSI (205 Kg/cm<sup>2</sup>). EXCESSIVE OPERATING PRESSURE WILL STRESS THE HYDRAULIC SYSTEM AND MAY LEAD TO COMPONENT FAILURE.**

**Outrigger Control Relief Pressure** - The outrigger control circuit is protected by the main system pressure relief system valve and no longer requires a separate outrigger relief valve. The outrigger controls may contain a relief valve. Disable this relief valve by turning the adjustment screw clockwise until the adjustment bottoms out.

 **CAUTION: NEVER CHANGE THE RELIEF SETTING WHILE PRESSURE IS BEING APPLIED TO THE SYSTEM THROUGH AN OPERATING VALVE.**

- D. Adjust the gearbox pinion clearance per "Gearbox Pinion Clearance Adjustment" instructions on the next paragraph.

**Gearbox Pinion Clearance Adjustment** - The gearbox pinion operates against the main bull gear to rotate the booms. It is necessary for the pinion gear to have a slight clearance when operating on the bull gear. Too much clearance can allow excessive movement of the platform, while too little clearance promotes accelerated wear on the gear teeth and can cause possible tooth failure. To reach an optimum setting, adjust the gear backlash with the pinion positioned on the high tooth of the bull gear. The high tooth location on the bull gear is either marked with three center punch marks or a "H" stamped on the front face of the tooth. Refer to the Turret Assembly illustration in option section for adjustment procedure.

- E. All load supporting bolts (rotation bearing bolts, pedestal/subframe mounting bolts, and platform rotator mounting bolts) must be physically retorqued to the specifications included on the torque chart in this section. All other critical fasteners must be visually inspected for rotation and signs of failure. If any loose fasteners are found both the nut and bolt **must be replaced and tightened to the proper torque**. Nuts and bolts, must never be reused. A new torque-seal mark must be installed. Refer to Figure 3.

**⚠ WARNING: IMPROPERLY TORQUED OR IMPROPER BEARING BOLTS CAN CAUSE DEATH OR SERIOUS INJURY.**

**Rotation Bearing Bolt Inspection** - The bolts fastening the rotation bearing to the turret and pedestal of the Versalift aerial device are one of the load supporting components and because of their location could be overlooked. Remove pedestal covers to allow access to the pedestal to turret mounting bolts. Refer to Figure 5.

If one or more bolts loosen or stretches, the loading is transferred to the properly torqued bolts making them support more than their share of load. Should the unit be allowed to operate in this manner the properly torqued bolts will eventually fatigue and failure may occur.

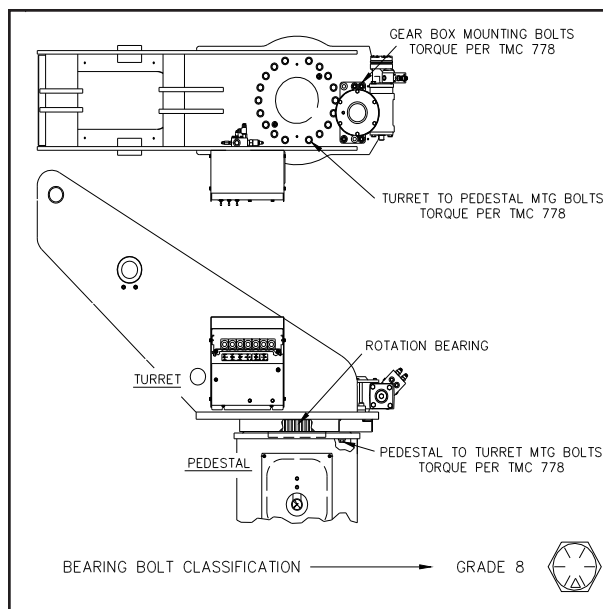
All load supporting bolts should be inspected visually each day, and checked for proper torque every six months at minimum, and more frequently if the unit is subjected to severe use.

**NOTE:** *Torque values are based on torquing the bolt head in all applications.*

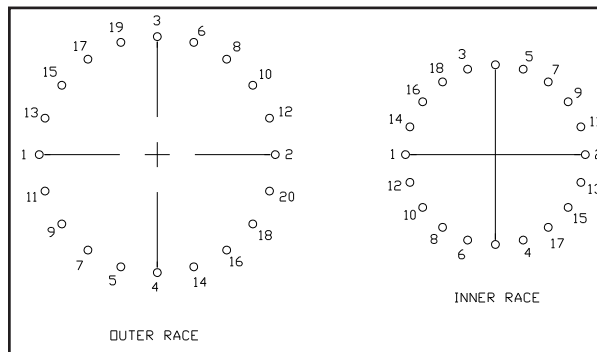
**NOTE:** *If the rotation bearing is removed, ensure the mounting surfaces are smooth and clean to endure full contact between the bearing and mounting surface.*

**Retorquing Procedure** - Retorque the rotation bearing bolts to the specifications included on the torque chart in this section and also according to the appropriate pattern shown on Figure 6 on the following page. Understand the entire procedure before starting the torque inspection.

Select the torque wrench that is verified to the correct value for the bolt in use. Torque the bolts in a diametrically opposed pattern (bolts directly across the diameter, move 90 degrees, and then tighten bolts directly across the diameter). Repeat until all bolts are torqued to the specified value.



**Rotation Bearing Bolts Inspection  
Figure 5**



**Rotation Bearing Bolts Torque Pattern  
Figure 6**

### 3. TESTING

- A. Perform dielectric test per ANSI A92.2 paragraph 8.2.4 item 16.

### EVERY YEAR OR 1500 PTO HOURS MAINTENANCE AND INSPECTION

#### 1. MAINTENANCE

- A. An application of light oil is recommended to maintain the smooth operation of control handles and actuators.
- B. Lubricate the leveling chains at the turret, platform, and upper and lower boom knuckles. A penetrating lubricant designed for chain use, such as Lubriplate "Chain and Cable Spray," should be applied at these four locations.

### EVERY 2 YEARS OR 3000 PTO HOURS MAINTENANCE AND INSPECTION

#### 1. MAINTENANCE

- A. The rotation bearing must be Inspected and evaluated. Refer to Maintenance and Inspection in this section for recommended bearing inspection procedures.

***Rotation Bearing Replacement Criteria-*** The rotation bearing must be inspected and evaluated. The recommended bearing inspection procedure includes the following.

1. Monitoring the trend of turret tilt measurements. Bearing inspections and turret tilt measurements can be used to determine when a bearing should be replaced. Generally, an increase in turret tilt of 0.065" (1.65 mm) above the initial tilt measurement or a total axial movement exceeding .125" (3.17 mm) indicates that the bearing may be reaching the end of its useful life. Other factors related to the condition of the bearing must be considered. Determine if the increase in the turret tilt measurements has been steady (which is normal) or if it shows a trend of accelerated wear which would indicate bearing replacement may be necessary.
2. Evaluating the "feel" of the unit. If there is no trend toward accelerated wear, consider the "feel" of the unit during load reversals. Operators may notice an increase in the tilting










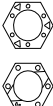



or rocking of the turret with respect to the pedestal top plate during load reversals.

3. Checking for rotation bearing noise and roughness. Determine whether there is any presence of roughness or noise in the rotation bearing during rotation. Severely worn bearings commonly exhibit grinding, snapping, and popping noises during rotation.
4. Inspecting the condition of the purged bearing grease. Grease from a well worn, poorly maintained, or damaged bearing will typically contain fairly large rust or metal particles, instead of metal dust specks which might be found in any bearing. Fairly large rust or metal particles indicate the bearing has reached an accelerated wear condition and immediate bearing replacement is required. Rust is commonly indicated by extremely dirty grease. This situation must be corrected to optimize the performance of the bearing. Always check the purged bearing grease at each inspection and turret tilt measurement procedure even if there is no presence of roughness, noise in the bearing, or significant change in the turret tilt measurement.

One or more of these evaluation criteria should detect the need for rotation bearing replacement long before there is a threat of failure. By maintaining proper rotation bearing lubrication and avoiding overload conditions, the replacement bearing should provide many years of service.

## BOLT MARKINGS &amp; TORQUE CHART

## Bolts With Nuts

Bolt Head Markings	Grade 5 Bolt  Highland  Infasco  Nucor	Grade 8 Bolt  Highland  Infasco  Nucor	Socket Head SPS SHCS & SHFH 
Nut Markings	Grade B PTLN  Gripco  Aztec	Grade C PTLN  Gripco  Aztec	Grade C PTLN  Gripco  Aztec
Bolt Thread & Size	Torque ft-lb (N-m)	Torque ft-lb (N-m)	Torque ft-lb (N-m)
1/4 - 20	74 in-lb (8)	N/A	155 in-lb (18)
5/16 - 18	145 in-lb (16)	N/A	240 in-lb (27)
3/8 - 16	15 (20)	21 (29)	32 (44)
7/16 - 14	29 (39)	N/A	N/A
1/2 - 13	43 (58)	55 (75)	55 (75)
5/8 - 11	75 (102)	98 (133)	160 (218)
3/4 - 10	125 (170)	167 (227)	N/A
7/8 - 9	178 (242)	N/A	N/A
1 - 8	378 (514)	N/A	N/A

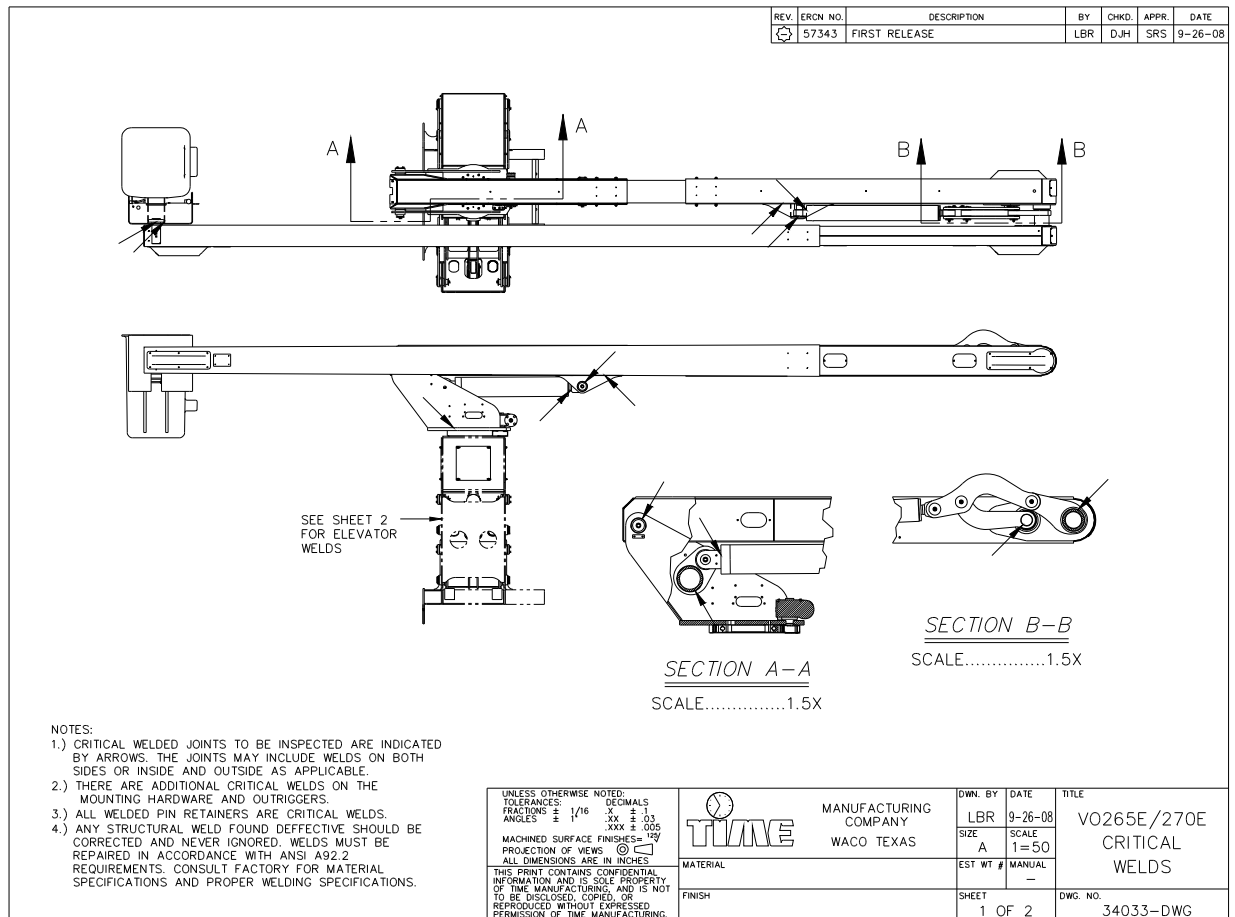
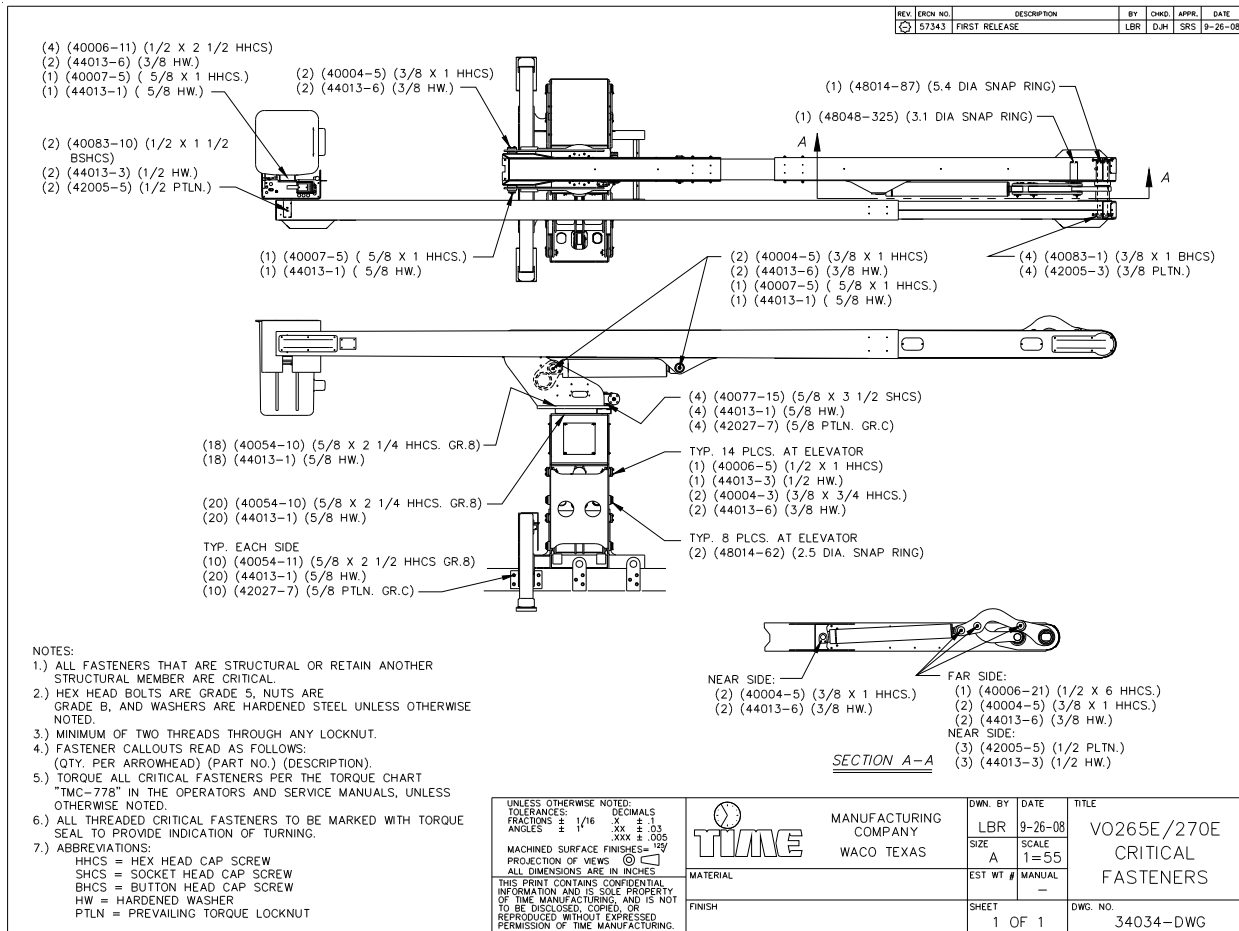
## Special Threaded Fastener Applications

Bolt Thread Size & Type	Lubricant	Tapped Material	Torque ft-lb (N-m)
1/4 - 20 Grade 5 HHCS	Loctite 262	Steel	15(20)
3/8 - 16 Grade 5 HHCS	Loctite 262	Steel	27 (37)
3/8 - 16 SHCS & SHFH	Loctite 262	Aluminum	15 (20)
3/8 - 16 Grade 8 HHCS	Loctite 262	Steel	37 (50)
1/2 - 13 SHCS	Loctite 262	Steel	89 (121)
5/8 - 11 SHCS	30W Motor Oil	Rotation Bearing	160 (218)
5/8 - 11 Grade 8 HHCS	30W Motor Oil	Rotation Bearing	160 (218)
3/4 - 10 Grade 5 Threaded Rod	Loctite 262	Grade B Nut	145 (197)
3/4 - 10 Grade 8 HHCS	30W Motor Oil	Rotation Bearing	315 (428)
3/4 - 10 Grade 8 HHCS	Loctite 262	A572-50 Steel	210 (286)

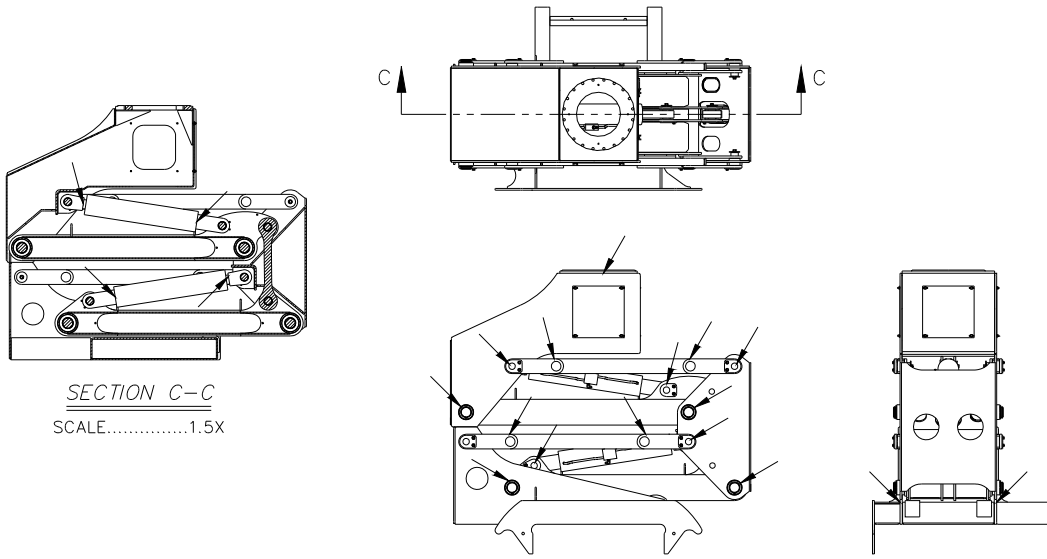
## NOTES:

1. Lubricate bolt threads liberally with 30W motor oil, unless fastener application is to be used on tapped material. Then use Loctite 262 on these fasteners with exception of rotation bearing.
2. Since the flat washers are stamped, one side will have a rough and sharp edge, the other is smooth and radiused. ALWAYS place the rounded side of the flat washer towards the head of the bolt to protect the fillet.
3. Apply torque to nut unless bolt is used in a tapped hole.
4. All torque values are "running" torques (for initial and replacement installation only); the nut (bolt head) must turn. Use of an impact wrench is permissible only for run-up, not for tightening. During confirmation of previously torqued fasteners, the nut (bolt head) should not turn if proper torque is maintained.
5. A minimum of two threads must protrude beyond the nut after tightening.
6. The marks shown on this chart are for our current fastener suppliers.
7. Refer to the critical fastener drawings for each Versalift for identification of specific fasteners.
8. HHCS = Hex Head Cap Screw; HW = Hardened Washers; PTLN = Prevailing Torque Lock Nut; SHCS = Socket Head Cap Screw; SHFH = Socket Head Flat Head.

March 1, 2007 / TMC-778



REV



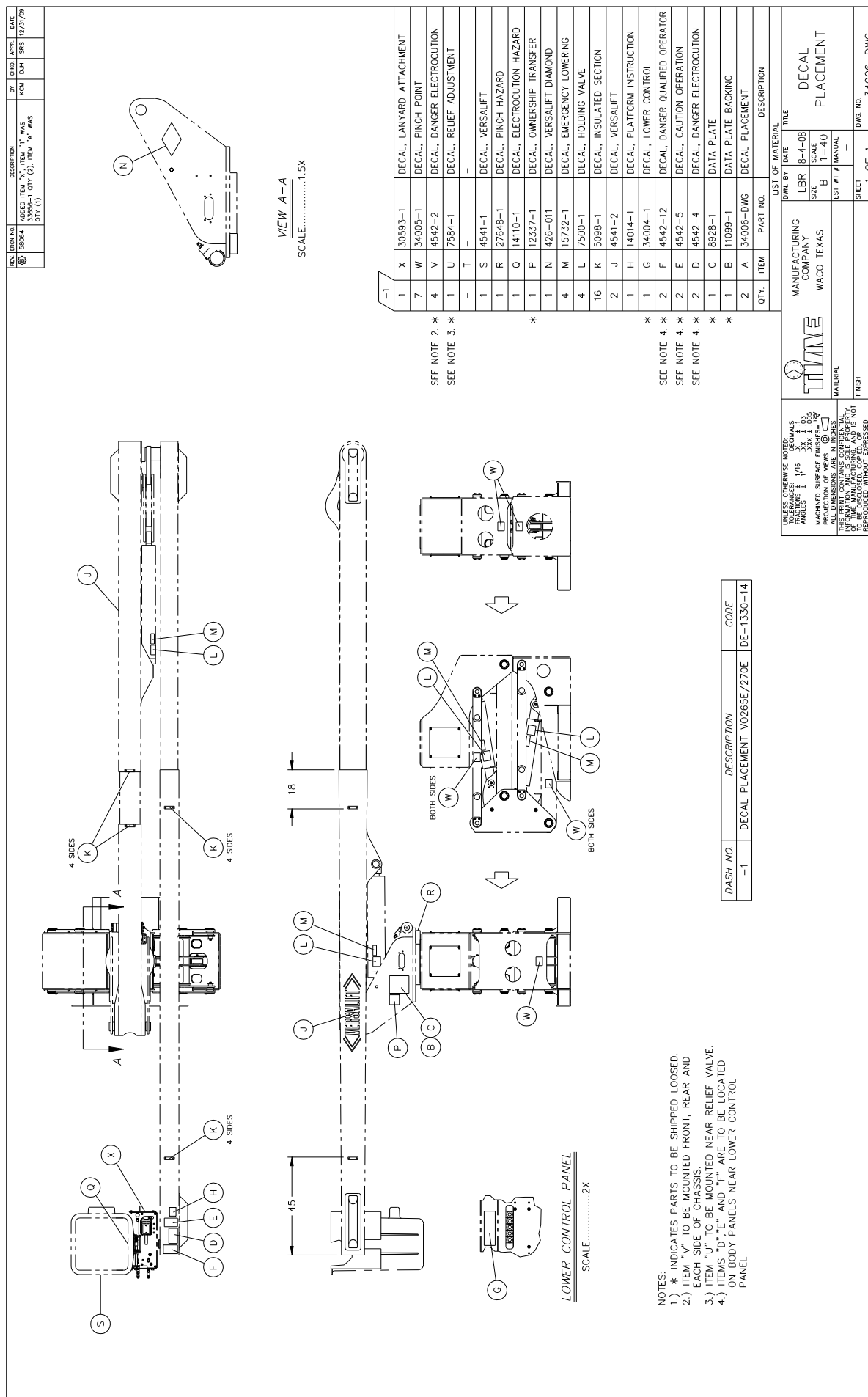
SECTION C-C  
 SCALE.....1.5X

ELEVATOR WELDS  
 SCALE.....1.5X

UNLESS OTHERWISE NOTED: TOLERANCES: FRACTIONS $\pm 1/16$ DECIMALS ANGLES $\pm .1$ MACHINED SURFACE FINISHES = $125 \sqrt{R}$ PROJECTION OF VIEWS $\odot$ ALL DIMENSIONS ARE IN INCHES THIS PRINT CONTAINS CONFIDENTIAL INFORMATION AND IS SOLE PROPERTY OF TIME MANUFACTURING, AND IS NOT TO BE DISCLOSED, COPIED, OR REPRODUCED WITHOUT EXPRESSED PERMISSION OF TIME MANUFACTURING.	 MANUFACTURING COMPANY WACO TEXAS	OWN. BY	DATE	TITLE VO265E/270E CRITICAL WELDS
		LBR	9-26-08	
MATERIAL	FINISH	SIZE	SCALE	DWG. NO.
		A	1=50	
SHEET	2 OF 2	EST WT #	MANUAL	34033-DWG
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SERVICE PROCEDURES

## SERVICE PROCEDURES





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# MAINTENANCE AND INSPECTION CHECKLIST AND RECORD

**VERSALIFT VO-265E/270E      SERIAL NO. \_\_\_\_\_      VEHICLE NO. \_\_\_\_\_**

Fill in date and initial boxes when each check is made. All inspections, adjustments, repairs, and lubrication must be made according to the Service and Installation Manual. Additional copies of this form can be obtained from Time Manufacturing Company. Refer to preceding pages for instructions.

## PERFORM DAILY CHECKS LISTED IN OPERATOR'S MANUAL EVERY DAY

<b>PRIOR TO PLACING UNIT IN SERVICE</b>	<b>DATE:</b>	
1. MAINTENANCE		
A. Perform the Daily Visual Maintenance and Inspection Checks (refer to Operator's Manual)		
B. Check Rotation Bearing Deflection (new bearing initial tilt measurement) <sup>1</sup>		

<b>30 DAYS OR 85 PTO HRS AFTER "IN SERVICE" DATE (ONE-TIME SERVICE)</b>	<b>DATE:</b>	
1. MAINTENANCE		
A. Replace Return Line Filter		

<b>3 MONTHS OR 250 PTO HRS AFTER "IN SERVICE" DATE (ONE-TIME SERVICE)</b>	<b>DATE:</b>	
1. MAINTENANCE		
A. Re-Torque All Load Supporting Bolts (Rotation Bearing Bolts, Platform Rotator Bolts, Pedestal/Subframe Mounting Bolts).		
B. Visually Inspect All Critical Fasteners.		

<b>EVERY 3 MONTHS OR 250 PTO HRS</b>	<b>DATE:</b>				
1. GENERAL INSPECTION					
A. Remove Trash/Debris					
B. Inspect Controls (Damage, Wear)					
C. Check For Interference					
D. Inspect Hoses (Damage, Wear)					
E. Wires/Electrical (Damage, Wear)					
F. Inspect Decals					
G. Inspect Boom Rests/Tie Down Strap					
2. STRUCTURAL INSPECTION					
A. Inspect Critical Fasteners					
B. Inspect Welds					
C. Inspect Structural Components (Deformation, Corrosion)					
D. Inspect Leveling System (Damage, Wear)					
E. Inspect Fiberglass Boom(s) (Damage)					
F. Inspect Platform (Cracks, Damage)					
3. OPERATIONAL CHECKS					
A. Check PTO/Pump					
B. Check Control Operation					
C. Holding Valves					
D. Check Clearances During Operation					
E. Check Leveling Operation					
F. Check For Hydraulic Oil Leaks					
G. Check For Cylinder Rod Damage					
4. MAINTENANCE					
A. Lube Rotation Bearings					
B. Lube Pinion					
C. Purge Air Lines					

**SERVICE PROCEDURES**



# MAINTENANCE AND INSPECTION CHECKLIST AND RECORD

**VERSALIFT VO-265E/270E    SERIAL NO. \_\_\_\_\_    VEHICLE NO. \_\_\_\_\_**

Fill in date and initial boxes when each check is made. All inspections, adjustments, repairs, and lubrication must be made according to the Service and Installation Manual. Additional copies of this form can be obtained from Time Manufacturing Company. Refer to preceding pages for instructions.

## PERFORM DAILY CHECKS LISTED IN OPERATOR'S MANUAL EVERY DAY

EVERY 6 MONTHS OR 500 PTO HRS	DATE:			
<b>1. INSPECTION</b>				
A. Check Hydraulic Oil (Contamination, Water)				
B. Check Slope Indicators (Adjustments)				
<b>2. MAINTENANCE</b>				
A. Replace Return Filter				
B. Clean Suction Strainer				
C. Adjust Relief Valve				
D. Adjust Pinion Backlash				
E. Retorque Load Supporting Bolts / Visually Inspect Critical Fasteners				
<b>3. TESTING</b>				
A. Dielectric Test Per ANSI A92.2				

EVERY YEAR OR 1500 PTO HRS	DATE:			
<b>1. MAINTENANCE</b>				
A. Lube Control Handles				
B. Lube Leveling Chain				

TWO YEARS OR 3000 PTO HRS	DATE:			
<b>1. MAINTENANCE</b>				
A. Rotation Bearing Inspection and Measurement <sup>1</sup>				

<sup>1</sup> Initially measure turret tilt as a baseline. Check rotation bearing every 2 years until it measures 0.050" increased wear from initial measurement. After reaching 0.05" increased wear, measure every 6 months. Refer to the Maintenance and Inspection section for proper procedures.

**SERVICE PROCEDURES**



## ADJUSTMENTS

**CARTRIDGE HOLDING VALVES** - Cartridge type holding valves are integral to the boom cylinders and elevator cylinders. Holding valves provide two important safety features. The holding valves provide smooth boom operation and in the event of hydraulic line failure the holding valves prevent the booms from dropping.

These holding valves are factory set and no adjustments are required. To determine if a holding valve is functioning properly, the following procedure must be followed.

To check the rod end holding valve for the upper boom cylinder, raise the upper boom a few inches with the lower boom stowed. With the hydraulic pump off and a load in the platform, slowly operate the upper boom fold function. The upper boom should not move.

To check the rod end holding valve for the lower boom cylinder, fully extend the lower boom cylinder and then retract it a few inches. With the upper boom horizontal, a load in the platform and the hydraulic pump off, slowly operate the lower boom raise function. The lower boom should not move.

To check the base end holding valve for the upper boom cylinder, unfold the upper boom until the platform is a few inches from the ground with the lower boom still stowed. With the hydraulic pump off and a load in the platform, slowly engage the upper boom unfold function. The upper boom should not move.

To check the base end holding valve for the lower boom cylinder, raise the lower boom a few inches and unfold the upper boom until the platform is a few inches off the ground. With the hydraulic pump off and a load in the platform, slowly engage the lower boom lower function. The lower boom should not move.

To check the base end holding valves for the elevator, raise the elevator a few inches out of the stowed position. With the hydraulic pump off and a load in the platform, slowly operate the elevator lower function. The elevator should not move.

**! DANGER: NEVER REMOVE HOLDING VALVES WITHOUT SUPPORTING THE BOOMS. FALLING BOOMS MAY CAUSE DAMAGE TO THE UNIT OR RESULT IN DEATH OR SERIOUS INJURY.**

If any holding valve does not hold the load during the test described, the holding valve may be removed from the cylinder. Identification of the proper holding valve

is as follows. The rod end of the upper boom cylinder holding valve is the cartridge nearest the ports or the lower boom. The cartridge furthest from the ports or the lower boom is for the base end of the upper boom cylinder.

The base end holding valve for the lower boom cylinder is located on the side opposite the lower boom (bottom side). The holding valve for the rod end of the lower boom cylinder is on the side opposite the ports. Care must be taken when removing holding valves.

A cylinder will not hold a load when a cartridge is removed. The booms must be supported or at the end of their travel to prevent the booms from dropping. All holding valve cartridges are accessible with both booms stowed and without disconnecting the ends of the cylinder.

Having removed a defective holding valve, check for visible contamination or defective external O-ring seals. If neither is the apparent, replace the entire cartridge. Never attempt to disassemble and reuse a defective cartridge.

Bleeder ports are provided for both upper and lower boom cylinders for emergency lowering. These ports are marked as base and rod for the desired boom movement. Slowly, loosen the setscrew, not the hex fitting, and be prepared for hot oil flowing from the bleeder ports. The bleeder ports should be used to relieve any trapped pressure inside the cylinder before removing the holding valve cartridges to prevent damage to the holding valve seals.

**BOOM ACTUATION SPEED** - The boom actuation speed is controlled by the system operating pressure and the pump or engine speed. Refer to "System Operating Pressure" in this section for the proper adjustment procedure of this function. A flow meter can be installed in the tool circuit to measure the flow rate. If the proper PTO has been installed, the maximum flow rate of 7 gpm (26 lpm) can be provided by adjusting the engine speed. Another method of verifying proper boom actuation speeds is to time one cycle with an operator in the platform. The recommended range for each boom actuation is given below. These times are approximate and may vary with platform load, boom position and other factors.

Rotation (CW or CCW)	55-65 seconds
Upper Boom (Unfold)	40-50 seconds
Upper Boom (Fold)	32-42 seconds
Lower Boom (Raise)	52-62 seconds
Lower Boom (Lower)	42-52 seconds
Elevator (Raise)	40-50 seconds
Elevator (Lower)	30-40 seconds

Exercise care when timing boom functions, to avoid reaching the end of boom travel while at full operating speed.

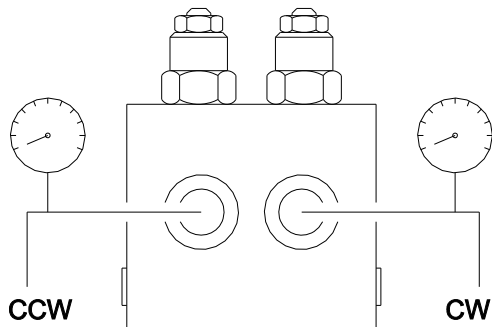
To accurately test the flow rate or lift actuation speeds, it is critical for the hydraulic oil to be warmed to operating temperatures between 70°F and 90°F (21°C and 32°C). Cold hydraulic oil will result in slow operation with increased engine speed having no affect. The engine speed, whether controlled by a manual throttle or an optional two speed throttle control, should be regulated to provide speeds within the specific ranges given for each function. To aid in warming the hydraulic oil, select the warmup mode to allow oil to circulate.

**OUTRIGGER/BOOM INTERLOCK (Optional)** - Refer to Parts & Assemblies Section.

### ROTATION MOTOR COUNTERBALANCE VALVES

- The rotation motor counterbalance valves are located in a manifold mounted to the motor.

1. Unbolt the rotation motor and disengage it from the rotation gearbox.
2. Tee 3000 psi (minimum) pressure gauges into each of the two motor ports, as shown in diagram below.



3. It is necessary to set the holding-valve pilot-pressure to obtain smooth rotation while maintaining adequate rotation speed. The higher the pressure setting, the more restrictive the valves are, providing smoothest operation. However, as the pressure is increased, a reduction in rotation speed may occur. The suggested pressure range is 1100 psi plus or minus 200 psi. Adjustments can be made on the pressure setting to obtain smooth operation on a slope and adequate rotation speed on level ground. Do not exceed 1300 psi. Excessive back-pressure can adversely affect the life of the motor shaft seal.
4. Start the unit and, from the lower controls, fully actuate the rotation control for clockwise (CW) rotation. Read the pressure gauge opposite the clockwise (CW) port and set the pressure to 1100

psi. To adjust the pressure setting, loosen the lock nut on the top of the the cartridge opposite the clockwise (CW) port, and with a 1/8 inch allen wrench turn the set screw counter-clockwise (CCW) to increase the pressure setting, and clockwise (CW) to decrease. Return the control to neutral and actuate again to verify pressure setting. Next fully actuate the rotation control for counter-clockwise (CCW) rotation and adjust the cartridge opposite the counter-clockwise (CCW) port to 1100 psi, in the same manner as before. Tighten the lock nuts after adjusting.

5. Remove the pressure gauge and reconnect the hoses to the motor. Install and bolt the motor to the gear box.
6. Start the unit and verify that the direction of rotation is correct. Reverse hose connections at the rotation motor if required. Verify smooth operation on a slope and adequate rotation speed on level ground.

## HYDRAULIC OIL RECOMMENDATIONS

Selection of suitable hydraulic oil is very important to ensure efficient operation and long life of hydraulic components. Suitable hydraulic oil for the aerial lift must meet the criteria listed below.

1. A petroleum (or vegetable) based oil.
2. A maximum viscosity of 1000 cSt at the minimum start-up temperature and a viscosity range of 10 to 40 cSt at the anticipated operating temperatures.
3. Anti-wear additives to ensure long life of the hydraulic components.
4. Anti-foam additives to minimize air entrapment.
5. Good chemical stability at anticipated operating temperatures.
6. A flash point that is above anticipated operating temperatures.
7. Good demulsibility or water separation characteristics.
8. Dielectric properties compatible with current leakage limitations for aerial lifts (Insulated aerals only).

Based on the requirements for a particular aerial lift application, one hydraulic oil can generally provide year round service. If a wide variation in start-up and operating temperatures is expected, hydraulic oil with a high viscosity index is recommended. Start-up at extremely cold temperatures will require oil with a low pour point. Therefore make certain the viscosity range requirements are still met when oil with a low pour point is needed.

The oil recommendations below are based on typical operating conditions. Certain operating conditions, additions or changes to the standard hydraulic system may require different oil grades. Time Manufacturing does not guarantee the use of any brand or grade of hydraulic oil. A reputable oil supplier should be consulted in any hydraulic oil application.

**Recommended Hydraulic Oil**

Operating Conditions	ISO Viscosity Grade	Ambient Temperature Range	
		Fahrenheit	Celsius
Standard - Recommended for most applications	22	0°F to 110°F	-18°C to 43°C
Severe Cold	15*	-20°F to 95°F	-29°C to 35°C
Extreme Heat	32	32°F to 120°F	0°C to 49°C

\* Oil to meet or approach MIL-H-5606A

A list of some suitable hydraulic oils is given below with their respective properties. This information will be helpful in the selection of hydraulic oil or equivalent oil for a particular application.

#### Hydraulic Oil Specifications

Brand Name	ISO Grade	Viscosity cSt		Viscosity Index	Pour Point		Flash Point	
		AT 40°C	AT 100°C		°F	°C	°F	°C
Exxon Unavis N 32	32	32	6.6	172	-54	-48	399	204
Mobil DTE 13M	32	32	6.1	141	-49	-45	410	210
Mobil Multipurpose ATF/Dextron III	32	36	7.5	184	-45	-43	370	188
Mobil EAL 224H	32	36	8.3	212	-29	-34	561	294
Shell Tellus T 32	32	32.4	6.4	155	-49	-45	320	160
Texaco Rando HDZ 32	32	32	6.4	155	-58	-50	428	220
Exxon Unavis N 22	22	22	5	175	-62	-54	313	156
Mobil DTE 12M	22	22	4.9	149	-54	-48	370	188
Shell Tellus T 22	22	22	4.9	150	-44	-42	349	176
Texaco Rando HDZ 22	22	23.1	5.1	155	-63	-53	370	188
Exxon Unavis HVI 13	15*	13.5	5.3	404	-76	-60	214	101
Mobil Aero HFA	15*	13.9	5.1	370	-76	-60	199	93
Shell AeroShell Fluid 4	15*	15	5	-	-75	-60	215	102
Texaco 5606H	15*	13.8	5.1	300	-107	-77	205	96
Kendall Hyken Glacial Blu	15*	14.9	4.4	233	-76	-60	340	171

\* Meets or approaches MIL-H-5606A

## CARE OF FIBERGLASS BOOMS

### BOOM CLEANING RECOMMENDATIONS

Fiberglass booms and inserts must be kept clean and in good condition to preserve their dielectric properties and appearance.

1. The fiberglass outer surface of the boom should be cleaned daily with a lint free cloth.
2. **DO NOT** Steam Clean Any Fiberglass or Insulated Components.
3. When the boom is dirty, raise the boom slightly, so it will drain, and wash the boom with a mild dish-washing detergent, using a cloth or sponge. Once the boom is washed inside and out, wipe the outer boom clean and dry with a lint-free cloth and allow the inner boom to air-dry completely.
4. In extremely difficult cleaning situations, pressure washing (using a garden hose and nozzle) can be used to clean the fiberglass boom. CAUTION: If the water pressure is too high, the boom, hoses, and fittings could be damaged.
5. If the boom has creosote, grease or other deposits that cannot be removed as suggested above, stronger cleaners may be used. However, be sure that these cleaners are not either 1) abrasive because they may damage the boom surface or 2) some other type that may leave a conductive residue on the boom. Time Manufacturing suggests Donar Chemicals "Electra Clean" and Costa Chemicals "Formula Five" as an acceptable product for the cleaning of these fiberglass booms. When heavily soiled booms are cleaned, make sure they are thoroughly rinsed and allowed to air dry as described in Item 3.
6. Once the fiberglass boom is clean, it should be coated with a product designed to protect its surface. A good wax designed for use on fiberglass not only protects the boom's glossy surface, but also provides a barrier against dirt, creosote, etc. Hasting Fiberglass Product, Inc., Costa Chemicals and Kearney offer a waxes designed for use on fiberglass. Donar Chemicals also offer a product called "Electra Guard", for use on fiberglass. For best results, fiberglass booms should be polished by hand.
7. After a boom is cleaned and dried, it should be dielectrically tested in accordance with ANSI Standards (Section 5.4.3) to verify its dielectric integrity and to detect conductivity changes in its

insulating section.

8. Fiberglass booms and inserts should always be cleaned before any dielectric test. Remember that cleaning and testing is required after repair or modification of any component that crosses the insulating system(s) or the repair or replacement of an insulating component(s).
9. If fiberglass accessories such as line-hose boxes or saw scabbards are attached to the boom, they should be removed during dielectric testing of the unit. They should also be washed and cleaned on a regular basis because they could reduce the dielectric integrity of the boom. Care should be exercised in the selection and placement of such accessories to ensure that the insulation is not compromised.
10. If, while inspecting or cleaning the boom, you discover chips, scrapes or abrasions that would allow moisture to get into the fiberglass boom, it should be recoated or sealed in accordance with manufacturer's recommendations. Any time there is a doubt regarding damage to the fiberglass booms or inserts, contact **Time Manufacturing Company** before any repairs are done.

## TROUBLE SHOOTING

The following is a list of problem conditions which may occur during operation of the Versalift, along with some possible causes.

### NO RESPONSE TO EITHER UPPER OR LOWER CONTROLS

1. Truck engine not running
2. PTO not engaged
3. Low hydraulic fluid supply
4. Relief valve set too low
5. Pinched pressure or return line
6. Defective hydraulic pump
7. Pressure compensated pump set too low
8. Lift controls not selected

### NO RESPONSE TO LOWER CONTROLS, UPPER CONTROLS O.K.

1. Platform override valve in wrong position
2. Plugged or defective control valve

### NO RESPONSE TO UPPER CONTROLS, LOWER CONTROLS O.K.

1. Platform override valve in wrong position
2. Safety trigger not actuated or adjusted properly
3. Plugged or defective control valve



4. Pinched or kinked pressure or return hose in boom
5. Emergency stop valve is activated

#### **SLOW OPERATION, ALL FUNCTIONS**

1. Valve spools not fully open
2. Oil too heavy or cold
3. Low hydraulic fluid supply
4. System operating pressure or main system relief set too low
5. Dirt or foreign matter in hydraulic system, filters valves etc.
6. Pinched or kinked hydraulic lines
7. Engine speed too low
8. Excessive leakage in pump or control valve due to wear
9. Safety trigger not adjusted properly

#### **SLOW HYDRAULIC CYLINDERS OPERATION, ROTATION O.K.**

1. Holding valves defective
2. Main relief valve set too low or open due to contamination
3. Excessive pump leakage
4. Internal cylinder leakage
5. System operating pressure set too low

#### **SLOW OPERATION OF ROTATION SYSTEM, BOOM MOTION O.K.**

1. Rotation motor defective

#### **EXCESSIVE SLACK OR ERRATIC MOVEMENT IN ROTATION SYSTEM**

1. Gearbox mounting bolts loose
2. Rotation bearing needs greasing
3. Excessive clearance between pinion and turntable bearing
4. Turntable bearing or pinion teeth damaged
5. Gearbox worn or defective
6. Rotation motor mounting bolts loose

#### **EXCESSIVE VIBRATION OR NOISE**

1. Pressure relief valve set too low
2. Holding valve defective
3. Air in hydraulic system due to low oil supply
4. Pump cavitating due to dirty suction strainer

#### **PLATFORM LEVELING SLOPPY, OUT OF LEVEL, OR ERRATIC**

1. Improper system tension.
2. Chain or rods are catching on something in the booms.

#### **BOOM DRIFTS DOWN WHEN CONTROLS ARE IN NEUTRAL**

1. Holding valve defective
2. Leakage past seals in hydraulic cylinder

#### **REMOTE ENGINE START/STOP INOPERATIVE**

1. Engine start/stop system not engaged
2. Pressure switch defective.
3. Airline pinched or leaking
4. Electrical box not grounded
5. Air cylinder defective

#### **TRUCK ENGINE PULLS DOWN OR STALLS WHEN CONTROLS ARE OPERATED**

1. Idle speed too slow
2. Engine still cold
3. Engine needs tune-up

#### **OVERHEATING OF HYDRAULIC SYSTEM**

1. Main system relief valve set too low or open due to contamination
2. System operating pressure too high
3. Excessive hydraulic oil flow due to improper PTO ratio or overspeeding of truck engine

## HYDRAULIC CYLINDER REPAIR

**! WARNING:** *HYDRAULIC CYLINDERS ARE CRITICAL LOAD HOLDING COMPONENTS AND MUST ONLY BE SERVICED BY QUALIFIED PERSONNEL. IMPROPER SERVICE MAY CAUSE A FALL RESULTING IN DEATH OR SERIOUS INJURY.*

Shut down the hydraulic system before removing any cylinder. Remove lines to cylinder and plug or cap them to prevent loss of fluid. Also plug cylinder ports to prevent loss of fluid. Tag or mark lines to prevent reversing connection when reassembling.

Outrigger cylinders should be repaired when they tend to drift down during road travel or up when extended in working position and the lock valves are not at fault. This downward drift indicates leaking cylinder seals. Immediate attention should be given to any outrigger cylinder that drifts. Damage could result if an outrigger should drift down during road travel.

Refer to the example of typical cylinder drawing in this section for part identification in the following procedures.

### REPAIR PROCEDURES

**! WARNING:** *CARE SHOULD BE EXERCISED WHEN REMOVING CYLINDERS, AS THEY ARE HEAVY. CYLINDERS SHOULD BE REMOVED BY MEANS OF A HOIST, IF AVAILABLE.*

1. Position the cylinder on a rail (if available) or a work bench and place the open port over a container in order to catch the hydraulic fluid. Extend the piston to the end of its stroke to purge the hydraulic fluid into the container. This can be done by using the rail (if available) or by manually pulling out the piston rod. Next, push the piston rod approximately one-half way back in.

**! WARNING:** *DO NOT USE AIR PRESSURE TO DISASSEMBLE HYDRAULIC CYLINDERS. AIR IS VERY COMPRESSIVE AND SERIOUS INJURY COULD RESULT.*

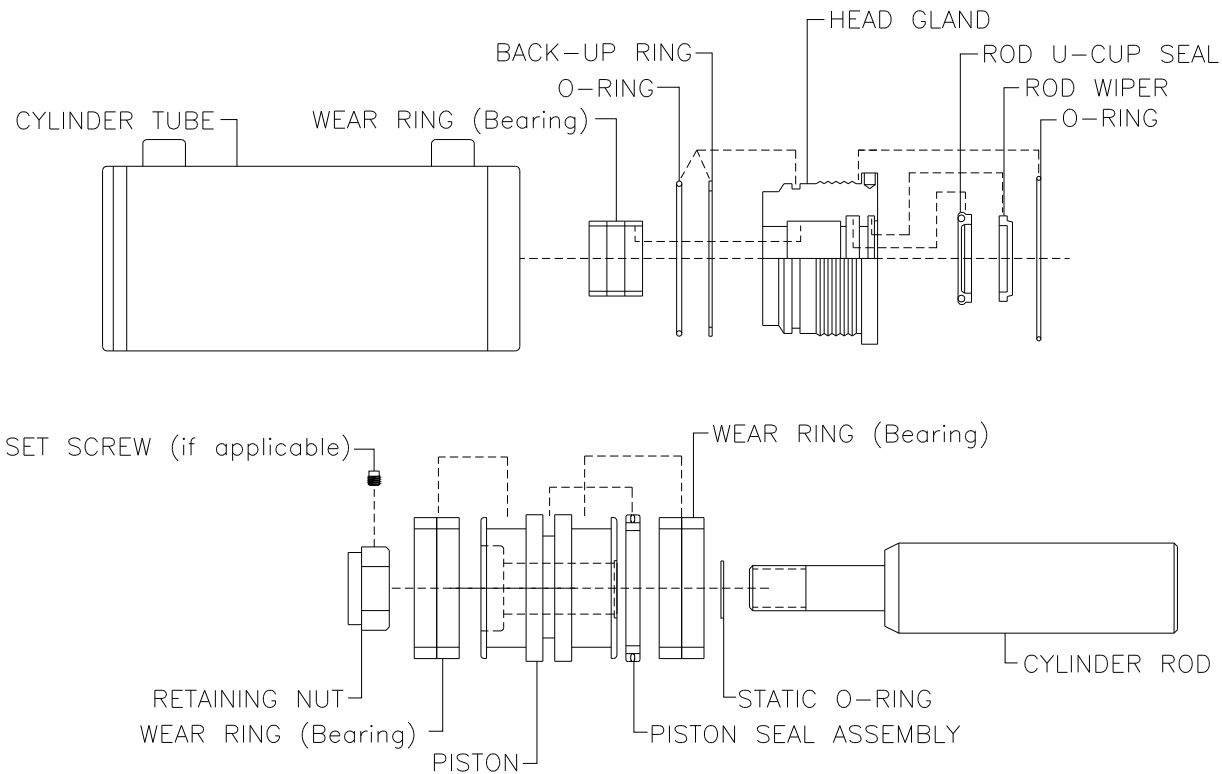
2. Remove gland nut or thread ring and plate on end of cylinder. Remove entire internal assembly from cylinder case by pulling on the piston rod. Pull out carefully to avoid scratching the inner finish. Inspect the inside of the case for gouges that would make an overhaul useless.
3. Remove all components from rod. Examine all components for wear, rust or other signs of deterioration. Clean all components of rust, especially inside the cylinder case. Make sure that all components are free of dirt or other contamination. After cleaning, coat all components with light grease before installing new seals and other parts.
4. Install new seals, wear rings and other parts as needed. Reassemble the cylinder assembly. Torque piston retaining nut (Refer to "Cylinders" section of this manual for cylinder and its piston nut torque values). Line inside of cylinder case, seals and threads with light grease. Insert the assembly into the cylinder case, making sure that cylinder wall is not scratched. Also, make sure that no dirt is introduced into the cylinder tube.
5. Use unit system pressure to cycle cylinder on work bench or on a test stand to purge air from cylinder and test for possible leakage.

**! DANGER:** *THE CYLINDER WILL BE EMPTY OF OIL AND FULL OF AIR AFTER REPAIR WHICH MAY MAKE INITIAL OPERATION DANGEROUS. THUS, THE CYLINDER SHOULD BE PURGED OF AIR. AFTER PURGING, FILL THE HYDRAULIC RESERVOIR TO THE FULL LEVEL, IF NEEDED, WITH ALL CYLINDERS RETRACTED. DO NOT RIDE THE PLATFORM WHILE AIR IS BEING PURGED. SERIOUS INJURY OR DEATH COULD RESULT.*

6. Install cylinder on unit. Perform the holding valve checks as described in section to determine if a holding valve is functioning properly and to verify there is no internal leakage. Re-check for any leaks.

# EXPLODED VIEW OF TIME MANUFACTURING CYLINDER (TYPICAL)

**Note:** To order replacement parts, refer to cylinders drawings in “Cylinders Option” section of this manual.



## UPPER BOOM REPLACEMENT PROCEDURE

In order to disassemble the upper boom, the steps below must be followed in the sequence given and performed at the indicated locations.

### AT THE PLATFORM:

1. Remove the upper cover and boom tip cover.
2. Disconnect and identify all hydraulic hoses at the upper controls which go through the booms.
3. Remove the clamps securing the hose bundle to the upper control panel.
4. Pull the hose bundle through the platform shaft and leave it hanging out the side of the boom. Wrap the ends of the hoses with tape to keep the hoses in a bundle. This makes it easier to pull them through the boom.
5. Disconnect the platform from the platform shaft. Leave the control panel attached to the platform.
6. To remove the platform shaft, disconnect the snap ring and special washer and slide the shaft out.

### AT THE KNUCKLE:

7. Remove the covers from the upper and lower boom knuckle area. Pull the hoses out of the upper boom and then out of the upper boom pivot shaft from the knuckle.
8. Use a paint pen, or torque stripe material, and place an index mark on the chain and sprockets at the knuckle and the platform to allow the leveling system to be reinstalled in the same orientation.
9. Loosen the upper and lower leveling through the access holes.
10. Disconnect the snap ring and remove the idler sprocket assemblies.
11. Remove the pin bolts and pin cap from the upper link at the boom connection.
12. Raise the upper boom for clearance for the pin to be removed. Secure the links and upper boom from moving and then remove the pin from the upper boom and upper links.



**CAUTION: EXERCISE CAUTION WHEN INSTALLING OR REMOVING THE UPPER BOOM CYLINDER AND LINK WELDMENTS. THE UPPER BOOM, LINK WELDMENTS, AND UPPER BOOM CYLINDER MUST BE SUPPORTED BEFORE REMOVAL AND INSTALLATION OF LINK PINS. KEEP HANDS AND FINGERS OUT OF PINCH POINTS.**

13. Remove the snap ring from the lower boom access hole and slide the boom out.
14. Remove the connector link on the lower side of the lower boom leveling system and remove the chain from the knuckle sprocket.
15. Remove the entire leveling system through the access hole.
16. Support the platform end of the upper boom and slide the upper boom off the lower boom. Remove the knuckle leveling sprockets from the knuckle.
17. Lower the upper boom to the ground.
18. Remove the platform shaft and the sprocket after driving the two spring pins out of the shaft.

### TO INSTALL THE UPPER BOOM THE FOLLOWING STEPS MUST BE FOLLOWED:

1. Install the platform shaft and the sprocket in the new boom. Orient the sprocket on the platform shaft as it was previously.
2. Position the upper boom on the lower boom and start the knuckle leveling sprockets into the bearings oriented as shown in the Leveling System Assembly drawing in Parts & Assemblies Section.

### AT THE KNUCKLE:

3. Align the upper boom pivot bearings and slide the upper boom onto the lower boom.
4. Install the lower boom leveling chain over the sprocket and install the connector link.
5. Pull the upper boom leveling system into the boom with the tensioner to the bottom of the boom and install the chain over the sprocket.

**AT THE TURRET:**

6. Apply tension to the lower boom leveling system. Refer to the "Leveling System Assembly" drawing in Parts & Assemblies Section to set the correct tension.

**AT THE PLATFORM AND THE KNUCKLE:**

7. Pull the chain over the sprocket so that the connector link aligns with the mark on the sprocket. Orient the chain on the sprocket at the knuckle until the platform shaft is oriented nearly vertical. Install the connector link and tension the upper boom leveling system. Refer to the "Leveling System Assembly" drawing in Parts & Assemblies Section.
8. Pull the hoses through the upper boom. The hose bundle should be to the lower boom side of the upper boom and come out of the access hole and through the platform shaft.
9. Raise the upper boom to clear the pin hole, secure the upper boom cylinder then extend or retract to line up the upper link holes and install the pin.

**⚠ CAUTION: EXERCISE CAUTION WHEN INSTALLING OR REMOVING THE UPPER BOOM CYLINDER AND LINK WELDMENTS. THE UPPER BOOM, LINK WELDMENTS, AND UPPER BOOM CYLINDER MUST BE SUPPORTED BEFORE REMOVAL AND INSTALLATION OF LINK PINS. KEEP HANDS AND FINGERS OUT OF PINCH POINTS.**

10. Secure the platform to the platform shaft.
11. Connect the hoses to the appropriate fittings on the control panel.
12. Secure the hose bundle to the bottom of the control panel.

**OPERATIONAL TEST AND INSPECTION:**

1. Operate the lift several cycles from the lower controls. Check the hose bundle for proper routing during operation. Check the fittings for hydraulic oil leaks.
2. Apply 1-1/2 times the rated capacity on the platform to confirm structural integrity of the new upper boom.

3. Check the platform leveling for proper operation. If required level the platform making adjustments at the turret.
4. Attach all of the covers that were removed.
5. Perform dielectric test per ANSI A92.2, paragraph 8.2.4, item 16.

# **SECTION 104**

## **VO-265E/270E INSTALLATION**

**INSTALLATION**

# INSTALLATION

## INTRODUCTION

Versalifts are designed to provide a safe and efficient method of placing workers at elevated work stations; however, the Versalift must be installed, tested, inspected, and maintained according to the manufacturer's instructions. Care and attention to detail will result in a properly installed unit which functions as it was designed.

**NOTE: On some Assembly and Installation drawings included in this section, some components are marked as shipped loose items. These items will require installation during the Versalift installation procedure. Refer to any component identification instructions in the ship loose box. Also refer to Parts & Assemblies section and this section in this manual for any additional information.**

This installation section includes pertinent information about the following:

- Planning the installation,
- Actual hardware considerations,
- Mounting location considerations,
- Hydraulic and electrical schematics and supplementary information,
- Test and inspection requirements for a newly installed unit, and pre-delivery inspection check list.

As with the installation of any heavy equipment, there will be many hazards that can occur. No manual can adequately warn against all potential hazards. Only by the attitude of the worker, being constantly aware of the possibility of danger, can most hazards be avoided. Warnings are provided throughout this section of this manual; they should be read, studied, and understood before any installation is started.

Failure to follow the steps in the appropriate section will result in:

- An unsafe installation; either the installation will not be complete or the lift will be inappropriately mounted on the chassis.
- An inappropriately tested lift and therefore a possible hazard to the user.
- lift incorrectly connected (electrically or hydraulically) to the chassis.
- A worker being injured during the installation process.


If you have questions during an installation, please call our Customer Service Department Toll Free number at (866) 543-8887. By successfully

completing the installation, testing the stability and dielectric strength (if insulated) of the installed unit, and performing the items listed on the pre-delivery checklist, we can be certain that our customer is receiving the quality they expect from their new Versalift.


The instructions of the following pages describe the recommended installation procedures. This information includes the tests and inspections necessary to determine that the unit has been correctly installed and is ready for use. Consult the illustrations provided to help clarify the text.

These instructions are written for competent service personnel and are not intended as a substitute for adequate training and experience. All the details and variations involved in an installation cannot be adequately covered by instructions. If further information is required contact your local **Versalift** dealer or **Time Manufacturing Company**.

**SHIPPING AND HANDLING** - A skid has been included with the **Versalift** to provide a means of handling the unit during shipment without damaging it.

 **DANGER: NEVER CONNECT HYDRAULIC POWER AND OPERATE THE VERSALIFT WHILE IT IS ON THE SKID. FAILURE OF THE SKID MAY RESULT CAUSING DEATH OR SERIOUS INJURY TO PERSONNEL OR DAMAGE TO THE EQUIPMENT.**

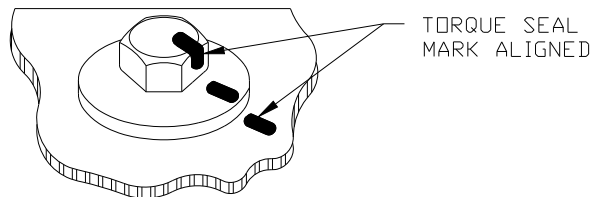
The shipping skid is designed for lifting the unit at its center of gravity with a forklift. When lifting the unit with a hoist, determine that the unit is balanced by initially lifting it a short distance off the ground. If the load is not balanced return it to the ground and make the proper adjustments. Remove the skid before lifting the unit into position for mounting. Stand clear of the unit while it is suspended.

 **DANGER: ALWAYS DETERMINE THAT A FORKLIFT OR HOIST IS CAPABLE OF SUPPORTING THE LOAD AT THE REQUIRED HEIGHT. NEVER ATTEMPT TO ADJUST THE BALANCE OF A LOAD WHILE IT IS SUSPENDED. LIFTING WITH INADEQUATE EQUIPMENT OR IMPROPER HANDLING MAY CAUSE THE LOAD TO DROP RESULTING IN DEATH OR SERIOUS INJURY OR DAMAGE OF THE LOAD.**

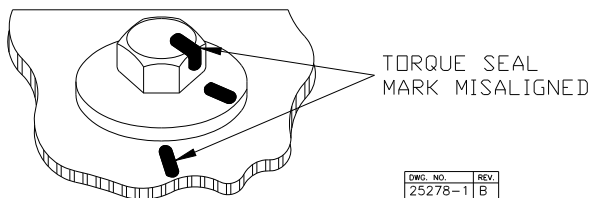
**FASTENERS** - Numerous fasteners are used throughout the installation process. There are minimum specifications required to securely attach the aerial lift components. Torque values are listed on the torque chart for the various sizes and grades of fasteners used on the **Versalift** aerial lift.

Prevailing torque nuts are used in structural applications to prevent loosening from vibration. To be effective, 2 threads must protrude beyond the locknut once tightened. Only install unused locknuts and bolts.

Torque seal marks are used on critical fasteners. This procedure provides a means for quick visual inspection of fastener condition. Do not use the lift if the Torque-Seal mark between the bolt head and mounting surface, are not in alignment. Refer to Figure 1 for Torque-Seal mark conditions.



**Torque Seal Mark In Acceptable Condition**



**Torque Seal Mark In Misalignment Condition**  
**Figure 1**

**WELDING SPECIFICATIONS** - Some mounting configurations require welding at installation. Welders must be AWS certified in accordance with ANSI A92.2 requirements. A general purpose welding rod or wire should be used. **Time Manufacturing Company** uses AWS ER70S-6 welding wire or a AWS E7018 welding rod [60,000 PSI (4218 Kg/cm<sup>2</sup>) yield and 25% elongation minimum]. Always position the components to provide proper access for welding. Make certain the weld size is according to engineering specifications. Repair welds must be repaired in accordance with ANSI A92.2 requirements. Consult factory for material specifications and proper welding specifications.

**VEHICLE AND MOUNTING SPECIFICATIONS** - All proposed aerial lift installations must be thoroughly














reviewed. The chassis must meet or exceed the dimensional, structural and aesthetic requirements. Dimensional specifications are important. Overall height, length, overhang, and clearances around the turret or under the booms are specific concerns. The position of the cross members of the chassis frame may affect mounting location. Varying the location of the aerial lift slightly may simplify the mounting procedure.

Before mounting the aerial lift, a weight distribution study is required to determine if the configuration is acceptable for the vehicle specified. Front and rear axle curb weight must be within the vehicle manufacturer's ratings. Minimum and recommended vehicle specifications are given for the aerial lift. When this information is verified, the installation can proceed.

Properly planning for an aerial lift installation will help guarantee proper performance and reliability of the **Versalift** aerial device.

# BOLT MARKINGS & TORQUE CHART

## Bolts With Nuts

Bolt Head Markings	Grade 5 Bolt  Highland  Infasco  Nucor	Grade 8 Bolt  Highland  Infasco  Nucor	Socket Head SPS SHCS & SHFH 
Nut Markings	Grade B PTLN  Gripco  Aztec	Grade C PTLN  Gripco  Aztec	Grade C PTLN  Gripco  Aztec
Bolt Thread & Size	Torque ft-lb (N-m)	Torque ft-lb (N-m)	Torque ft-lb (N-m)
1/4 - 20	74 in-lb (8)	N/A	155 in-lb (18)
5/16 - 18	145 in-lb (16)	N/A	240 in-lb (27)
3/8 - 16	15 (20)	21 (29)	32 (44)
7/16 - 14	29 (39)	N/A	N/A
1/2 - 13	43 (58)	55 (75)	55 (75)
5/8 - 11	75 (102)	98 (133)	160 (218)
3/4 - 10	125 (170)	167 (227)	N/A
7/8 - 9	178 (242)	N/A	N/A
1 - 8	378 (514)	N/A	N/A

## Special Threaded Fastener Applications

Bolt Thread Size & Type	Lubricant	Tapped Material	Torque ft-lb (N-m)
1/4 - 20 Grade 5 HHCS	Loctite 262	Steel	15(20)
3/8 - 16 Grade 5 HHCS	Loctite 262	Steel	27 (37)
3/8 - 16 SHCS & SHFH	Loctite 262	Aluminum	15 (20)
3/8 - 16 Grade 8 HHCS	Loctite 262	Steel	37 (50)
1/2 - 13 SHCS	Loctite 262	Steel	89 (121)
5/8 - 11 SHCS	30W Motor Oil	Rotation Bearing	160 (218)
5/8 - 11 Grade 8 HHCS	30W Motor Oil	Rotation Bearing	160 (218)
3/4 - 10 Grade 5 Threaded Rod	Loctite 262	Grade B Nut	145 (197)
3/4 - 10 Grade 8 HHCS	30W Motor Oil	Rotation Bearing	315 (428)
3/4 - 10 Grade 8 HHCS	Loctite 262	A572-50 Steel	210 (286)

### NOTES:

1. Lubricate bolt threads liberally with 30W motor oil, unless fastener application is to be used on tapped material. Then use Loctite 262 on these fasteners with exception of rotation bearing.
2. Since the flat washers are stamped, one side will have a rough and sharp edge, the other is smooth and radiused. ALWAYS place the rounded side of the flat washer towards the head of the bolt to protect the fillet.
3. Apply torque to nut unless bolt is used in a tapped hole.
4. All torque values are "running" torques (for initial and replacement installation only); the nut (bolt head) must turn. Use of an impact wrench is permissible only for run-up, not for tightening. During confirmation of previously torqued fasteners, the nut (bolt head) should not turn if proper torque is maintained.
5. A minimum of two threads must protrude beyond the nut after tightening.
6. The marks shown on this chart are for our current fastener suppliers.
7. Refer to the critical fastener drawings for each Versalift for identification of specific fasteners.
8. HHCS = Hex Head Cap Screw; HW = Hardened Washers; PTLN = Prevailing Torque Lock Nut; SHCS = Socket Head Cap Screw; SHFH = Socket Head Flat Head.

March 1, 2007 / TMC-778

## INSTALLATION AND PRE-DELIVERY

### MOUNTING INSTRUCTIONS

Refer to the specific mounting hardware options in “Parts and Assemblies” Section in this manual for lift installation drawings.

**REVERSE MOUNT INSTALLATION** - The elevator is designed to be shear plate mounted to the chassis frame. Place the elevator assembly and outriggers on the chassis and position as required. Weld the outriggers to the elevator and weld the shear plates as shown on the installation drawing.

Install the lower controls and ground controls in an accessible location in accordance with ANSI A92.2. Connect the hydraulic hoses as shown in the hydraulic schematic in this section.

**REAR MOUNT INSTALLATION** - For a rear mount installation, the elevator is designed to be attached to a full-length subframe. Place the elevator, outriggers, and subframe components on the chassis frame and position as required. Weld all components as shown in the installation drawing.

Install the lower controls and ground controls in an accessible location in accordance with ANSI A92.2. Connect the hydraulic hoses as shown on the assembly drawings in Parts & Assemblies Section.

**PTO & PUMP INSTALLATION** - The PTO and pump selection will determine the hydraulic pump flow that will be produced and the speed at which the engine must operate for proper aerial lift performance. Insufficient hydraulic oil flow will result in unsatisfactory speeds of operation. Excessive hydraulic oil flow will reduce the ability to control movement of the aerial lift, generate excessive dynamic loads, and cause elevated hydraulic system operating temperatures. The rated hydraulic oil flow to an aerial lift should never be exceeded. The selection of a PTO depends primarily on the transmission make and model. Refer to the PTO manufacturer’s application for the best results.

The open-center, fixed displacement, vane pump provided has a straight keyed shaft and an SAE A flange. This pump has a volumetric efficiency of 92 percent and pump displacement is 2.02 in.<sup>3</sup> (33 cm<sup>3</sup>) per revolution.

To calculate the engine speed required for proper operation use the following formulas.

$$\text{Engine Speed} = \frac{231 (\text{IN}^3/\text{GAL}) \times \text{Pump Flow (GPM)} \times 10,000}{\text{Displacement (IN}^3/\text{REV)} \times \text{Pump Efficiency(\%)} \times \text{PTO(\%)}} \quad (\text{RPM})$$

Use the information given above to find the desired engine RPM. If the PTO has a 1:1 ratio, (and the pump has 92% volumetric efficiency) and the standard open center pump the equation would be as follows:

$$\text{Engine Speed (RPM)} = \frac{231 (\text{IN}^3/\text{GAL}) \times 8 (\text{GPM}) \times 10,000}{2.2 (\text{IN}^3/\text{REV}) \times 92 (\%) \times 100 (\%)} = 913 \text{ RPM}$$

In some cases, hydraulic tool operation may require a flow less than 7 GPM (26 lpm). An effective means of lowering the flow is to select a PTO that will provide the desired flow at idle. However, on closed center hydraulic systems if the required PTO is not available or if a PTO has already been installed, the optional maximum flow stop-kit can be installed in the pump to reduce the flow. A manual or automatic throttle control will allow higher flow rate when necessary. However, the closed center flow sensing throttle control does not require the maximum volume stop kit because the engine speed is increased by any lift function, including tool operation, thus making the 7 GPM (26 lpm) available.

Mount the PTO according to the manufacturer installation instructions. Refill the transmission with an appropriate oil. Install the hydraulic pump to the PTO using two 1/2 in. Grade 5 fasteners. Tighten bolts as specified.

Before connecting the suction line to the oil reservoir, fill the hose with hydraulic oil. On initial start up, the pump case should be filled with oil and the air bled from the pump outlet to prime it.

If an installation hose kit option was ordered, use the hoses provided. The pump pressure hose is 1/2 in. (13 mm) and the suction hose is 1-1/4 in. (39 mm). Connect the 1/4 in. (6 mm) pump control drain line to the 1/4 in. fitting in the return line, between the return filter and reservoir.

**! CAUTION: PUMP DAMAGE WILL OCCUR IF THE PUMP IS RUN WITHOUT HYDRAULIC OIL.**

Before initial operation check the following items and correct if necessary. This will allow pump start-up at minimal pressure.

1. Transmission is full of fluid.
2. Pump case is full of oil.
3. Suction hose is full of oil.
4. Ground controls have been selected.
5. Oil reservoir is full.
6. Pump hoses are clear of drive line and exhaust system.

Start the engine and release the clutch gradually to rotate the pump as slow as possible. The pump and PTO should operate quietly. If excessive noise occurs check for these problems.

1. Improper backlash of PTO. (Should be .006" to .012" backlash)
2. Hydraulic pump is not primed.
3. Air leak in the suction line.
4. Shutoff valve in the suction line is not open.

The ground controls can be operated once the hydraulic pump is operating. Adjustment of the engine speed should be done after installation of the aerial lift and are discussed later.

**INSTALLING THE AERIAL LIFT** - The center of gravity of the **Versalift** sitting on the shipping skid is about 14 in. (356 mm) beyond the turret end of the lower boom insert. Attach the hoist to the lower boom insert at 2 points. Lift up the **Versalift** while the bolts holding the **Versalift** to the shipping crate are being removed. Be sure the **Versalift** is well balanced before completely removing the mounting bolts at the turret.

**! DANGER: NEVER REUSE SHIPPING BOLTS WHEN MOUNTING THE VERSALIFT TO THE PEDESTAL. USED BOLTS MAY FAIL RESULTING IN DEATH OR SERIOUS INJURY.**

Remove all paint and grease from the rotation bearing mounting surface. Mount the **Versalift** to the pedestal using the socket head cap screws and hardened washers supplied. Lining up of the turret and the pedestal can be simplified by using guide bolts. Guide bolts can be made by cutting the heads off two 5/8 in. x 11 NC bolts and screwing them into the rotation bearing. The protruding ends of the guide bolts will align the turret as it is lowered onto the pedestal. Remove the guide bolts and replace them with the socket head cap screws provided. Torque-seal mark the bolts after torquing the bolts as specified on the chart.

Refer to the "Continuous Rotation Assembly" illustration in Parts & Assemblies Section. Install the 1/2 in. Inner Diameter grommet in the drive strap. Bolt the drive strap to the rotary joint. Rotate the drive strap until the holes on the drive strap brace are in line with the drive strap brace holes provided in the pedestal. Bolt the drive strap brace to the pedestal as shown. Connect the rotary joint to the filter using the hoses provided. The return hoses to the filter should be connected to ports 1 and 3. Port 2 is for the pressure hose from the control selector valve.

**! CAUTION: REMOVE TOOLS, SLINGS, HARDWARE, AND ANY OTHER LOOSE OBJECTS BEFORE OPERATING THE MACHINE. FALLING TOOLS MAY CAUSE SERIOUS INJURY TO PERSONNEL.**

**! CAUTION: OPERATE THE LIFT FROM THE LOWER CONTROLS FOR SEVERAL CYCLES TO PURGE THE AIR FROM THE HYDRAULIC SYSTEM.**

From the lower controls, operate the outriggers and all lift functions through several cycles to purge the air from the hydraulic system. Check the hydraulic oil level in the reservoir and refill if necessary.

**LOWER BOOM SUPPORT** - Rotate the **Versalift** until the bottom boom is in line with the centerline of the chassis and body. See the illustration entitled "Lower Boom Rest Installation", in Parts & Assemblies section, for further information.

**UPPER BOOM SUPPORT** - Position the upper boom so that the platform has adequate clearance over the cab, if reverse mounted. Approximately 8 in. (203 mm) is required for a cab guard. For further information, regarding the installation of the upper boom support, see the illustrations in Parts & Assemblies Section.

**! CAUTION: TO AVOID STRESS OR DAMAGE TO THE UNIT, THE WEIGHT OF A STORED BOOM SHOULD BE SUPPORTED BY THE BOOM SUPPORT AND NOT BY THE HYDRAULIC CYLINDER.**

**ELECTRICAL BOX MOUNTING** - The electrical box may be mounted anywhere inside the cab. Do not mount the electrical box in the engine compartment because it is not waterproof. Holes may be drilled in the box for mounting purposes. Mount the dash accessories as shown on the "Electrical Controls Switch Mounting" illustration in Parts & Assemblies Section. Position the dash accessories where there is enough room for the decals.

### ENGINE/START/STOP CONTROL (OPTIONAL) -

When mounting the toggle switch, the key way should be down so switch movements correspond to decal instructions. Follow the wiring schematic in Parts & Assemblies Section. Remove the collector ring assembly cover and push the 14 gauge yellow wire up through the grommet located in the rotary joint strap. Keep feeding the wire through the grommet until it comes out of the top of the collector ring assembly. Using the wire nut provided, connect the wire to the number one wire in the center of the collector ring.

### MANUAL THROTTLE CONTROL (OPTIONAL) -

If the engine start/stop control has been installed, locate this electrical box adjacent to the start/stop electrical box. Electrical power for the throttle control can be taken from terminal six in the start/stop control electrical box. Wire according to the wiring schematic in Parts & Assemblies section. Remove the collector ring assembly cover. Push the 14 gauge blue wire up through the grommet in the rotary joint strap. Keep feeding the wire through the grommet until it comes out of the top of the collector ring assembly. Using the wire nut provided, connect the wire to the number three wire in the center of the collector ring.

### AUTOMATIC THROTTLE CONTROL (OPTIONAL) -


Wire the automatic throttle control as drawn on the schematic in this section.

### EMERGENCY HYDRAULIC POWER (OPTIONAL) -

For reverse-mount units, position the emergency power unit in the pedestal and drill four 7/16 in. (11 mm) mounting holes. Bolt the unit in place. The rear-mount pedestal has mounting holes located on the outrigger cover.

Connect the hydraulic lines as drawn on the hydraulic schematic in this section. The check valve with emergency power must be installed as shown to prevent leakage back through the emergency pump.

Wire the motor as illustrated on the electrical schematic in Parts & Assemblies Section. Remove the collector ring assembly cover. Push the 14 gauge orange/white wire up through the grommet in the rotary joint strap. Keep feeding the wire through the grommet until it comes out of the collector ring assembly at the top. Using the wire nut provided, connect the wire to the number two wire in the center of the collector ring.

 **CAUTION: FAILURE TO PRIME THE PUMP BEFORE INITIAL OPERATION MAY CAUSE PUMP DAMAGE.**

If the emergency power motor doesn't work, make certain the truck ignition switch is on and the pressure switch is adjusted properly. If the motor still does not operate, it may be insulated from the mounting by paint. The motor must be grounded directly to the truck body or frame. Mount the motor cover on reverse-mount units.

**AUXILIARY OUTRIGGER INSTALLATION** - Auxiliary outriggers may be mounted between the cab and body or in the front of the body. A body 6 in. (152 mm) shorter than normal [An 8 in. (203 mm) gap between the cab and body] is required.

Check the weight distribution, especially the load on the front axle, before selecting the outrigger positions.

Attach the outriggers to the frame as shown on the "Auxiliary Outrigger Installation" illustration in Parts & Assemblies Section.

Mount the outrigger control valves. They may be mounted anywhere clearance will allow. However, ANSI A92.2 requires that the outrigger controls are located where the operator can watch the outriggers move.

### PREDELIVERY TESTING AND INSPECTION

The American National Standards Institute Standard A92.2 entitled "American National Standard for Vehicle-Mounted Elevating and Rotating Aerial Devices" requires that each aerial device be tested to ensure compliance with the prescribed requirements. Such predelivery testing and inspection are the responsibility of the final installer. All paragraphs identified by number are part of ANSI A92.2.

"The installer of an aerial device shall, before the mobile unit is placed in operation, perform stability tests in accordance with requirements of 4.5.1 and 4.5.2, the operational and visual tests in accordance with requirements of 6.6.1 and 6.6.2, and the appropriate electrical tests required in 5.4.3 of this standard."

**MECHANICAL TESTS AND INSPECTION** - Section 6.6 of the ANSI A92.2 standard reads as follows.

**"6.6.1 Operational Tests.** - In addition to the manufacturer's prototype tests and quality assurance measure, each aerial device, including mechanisms, shall be tested by the manufacturer to the extent necessary to ensure compliance with the operational requirements of this section.

Some examples are:

- 1) Boom(s) elevating and lowering mechanism

- 2) Boom extension mechanism
- 3) Rotating mechanism
- 4) Stability tests
- 5) Safety devices. Each aerial device shall be operated to verify the function of all safety devices.

When the mobile unit is not completed by the manufacturer, such tests, which can be performed only after complete assembly and installation, shall be the responsibility of the final installer."

Section **4.5 Stability** reads as follows:

**"4.5.1 Stability On Level Surfaces** - Each aerial device, when mounted on a vehicle meeting the manufacturer's minimum vehicle specifications, without readily removable tools and material and used in a specific configuration, shall comprise a mobile unit capable of sustaining a static load one and one-half times its rated load capacity, in every position in which the load can be placed within the definition of the specific configuration, when the vehicle is on a firm and level surface.

The load shall be applied at one and one-half times the platform capacity at the center of the platform simultaneously with one and one-half times the lifting attachment supplemental capacity in its position of maximum overturning moment when so equipped.

Simultaneous application of platform capacity and supplemental capacity shall be performed only on the aerial devices that are designed for use with both types of load applied simultaneously.

If having outriggers or other stabilizing components utilized is part of the definition of the configuration, they shall be so utilized according to the manufacturer's instructions for the purposes of determining whether the mobile unit meets the stability requirements."

With the truck on firm level ground, the lower boom fully raised, and the upper boom horizontal, rotate to the front or rear and suspend the appropriate weight from the platform. Rotate the lift to the side, adding ballast to the truck frame if required to achieve stability. The placement of any ballast will affect the stability and the final weight distribution and must be evaluated.

**"4.5.2 Stability On Slopes** - Each aerial device, when mounted on a vehicle meeting the manufacturer's minimum vehicle specifications without readily removable tools and material and used in a specific configuration shall comprise a mobile unit capable of sustaining a static load one

and one-third times its rated load capacity in every position in which the load can be placed within the definition of the specific configuration when the vehicle is on a slope of 5 degrees in the direction of least stability.


The load shall be applied at one and one-third times the platform capacity at the center of the platform, simultaneously with one and one-third times the lifting attachment supplemental capacity in its position of maximum overturning moment when so equipped. If having outriggers or other stabilizing components utilized is part of the definition of the configuration, they shall be utilized according to the manufacturer's instructions for the purpose of determining whether the mobile unit meets the stability requirements.

Simultaneous application of platform capacity and supplemental capacity shall be performed only on aerial devices that are designed for use with both types of load applied simultaneously."

**"4.5.3 Effects of Stability Test** - None of the stability tests described in 4.5.1 and 4.5.2 shall produce instability of the mobile unit or cause permanent deformation of any component.

**Note:** During the stability test, the lifting of a tire(s) or outrigger(s) on the opposite side of the load does not necessarily indicate a condition of instability."

It is recommended that any weight applied to an aerial lift during a stability test, be suspended near the ground. This will prevent overturning in the event an unstable condition is encountered.

 **CAUTION: EXERCISE CARE WHEN PERFORMING STABILITY TESTS. KEEP PEOPLE CLEAR AND OBSERVE WHAT IS HAPPENING. HANDLE THE WEIGHT CAREFULLY AND APPLY THE LOAD SLOWLY.**

During a stability test either on a level surface or on a 5° slope extend the outriggers as far as practical to adequately support the aerial lift. The aerial lift must be tested with the booms in two positions to verify the position most likely to cause overturning. The first and most likely least stable position is with the lower boom fully raised and the upper boom horizontal while on the 5° slope. With the booms in this position rotated either to the front or rear suspend the specified weight (1-1/3 times the rated capacity) from the aerial lift and slowly rotate the lift to the down hill side of the vehicle. Add ballast to the chassis frame if required to achieve

stability. The placement of any ballast will affect the stability as well as the final weight distribution and must be evaluated in these respects.

Once the aerial lift has been stabilized in this configuration, position the lower boom horizontal and the upper boom unfolded to a horizontal position and verify the unit is stable in this position, on the 5° slope. Add ballast, if required, to provide stability.

Verify the aerial lift is stable on a level surface in both boom positions described above while applying the appropriate load (1 1/2 times the rated capacity).

Having met the stability requirements, the data plate provided must be completed with the empty curb weight of the mounted configuration. It must then be installed on the aerial lift, as shown on the decal placement drawing. The data plate certifies that the completed installation meets the stability requirements of the Occupational Safety and Health Act and American National Standard Institute.

### **Stability Test Capacity Options**

Time Manufacturing Company has prepared a stability test capacity option drawing to identify the appropriate capacity options that are currently available for this model. This drawing also will identify the different boom positions, in which the static load can be placed during stability testing when the vehicle is on a level surface or a 5° slope. Refer to the options section of this manual for the specific capacity option drawing.

**Inspection - "6.6.2 Visual Inspection** - After testing, a visual inspection of all components shall be made for evidence of defects; such as deformation of any component, loose connections, damaged wire rope, hydraulic leaks, and other items critical to the safe operation of the aerial device."

The recommended range for each boom function at 8 GPM (30 LPM) is given below. These times are approximate and may vary with platform load, boom position and other factors.

Rotation (CW or CCW)	55-65 Seconds
Upper Boom (Unfold)	40-50 Seconds
Upper Boom (Fold)	32-42 Seconds
Lower Boom (Raise)	52-62 Seconds
Lower Boom (Lower)	42-52 Seconds
Elevator (Raise)	40-50 seconds
Elevator (Lower)	30-40 seconds


Exercise care when timing boom functions, to avoid reaching the end of boom travel while at full operating speed.

The operational tests required include verifying that all aerial lift functions, controls and safety devices are operable. Included as an operational requirement is the speed at which boom functions are accomplished. Slow operation is impractical for the user and excessively fast operation can create unsafe conditions. It is recommended that the hydraulic oil flow rate and the system operating pressure be measured to guarantee proper boom actuation speeds. The correct flow rate is 7 gpm (26 lpm). The correct system operating pressure is 2900 psi (205 kg/cm<sup>2</sup>). This procedure is explained in the service procedures of the Service Manual. An alternative means of verifying proper boom actuation speeds is to time one cycle with on operator in the platform.

To accurately test the boom actuation speeds, the hydraulic oil must be first warmed to operating temperatures between 70°F and 90°F (21°C and 32°C). Cold hydraulic oil produces slower boom operation and increasing the engine speed will have no effect on the boom speed. The engine speed, whether controlled by a manual throttle or an optional two speed throttle control, should be adjusted to provide speeds within the specific ranges given for each function.

**DECALS** - Caution and operational decals or placards provided with this Versalift must be in place and clearly legible. As specified in ANSI A92.2 6.5, any decal or placard damaged or removed during shipment or installation must be replaced. Refer to the "Decal Placement" illustration in this section for the location and description of each decal. In addition to the minimum curb weight placard provided to indicate stability requirements, three decals are included for placement on the chassis or body to warn of electrocution hazards. One is to be placed on each side and the rear of the completed unit.

**ELECTRICAL TESTS** - The purpose of dielectric or electrical certification tests is to verify the protective level of insulation (fiberglass) on an insulated aerial lift.

 **CAUTION: THE PLATFORM IS NOT INTENDED TO PROVIDE ANY INSULATION FROM ELECTRICAL SOURCES. FOR THE PLATFORM TO BE CONSIDERED INSULATED THE ADDITION OF AN ELECTRICALLY CERTIFIED PLATFORM LINER IS REQUIRED.**

Time Manufacturing Company performs a dielectric test on each insulating Versalift aerial device to the qualification voltage ratings as shown on Table 1 of ANSI A92.2 in accompanying Manual of

Responsibilities.

The following excerpts from ANSI A92.2, Responsibilities of Dealers and Installers reads as follows:

**7.5 Installations -**" For insulating aerial devices, the installer shall assure conformance to the Qualification test requirements of 5.3.2 by either obtaining certification of the test and performing a periodic test after installation, or by performing the Qualification test."

After the Versalift is in service, Time Manufacturing Company recommends dielectric testing be arranged every six months on a regular basis, and after every major inspection, or whenever the insulation value is suspect. Only certified technicians are qualified to conduct these tests. Consult ANSI A92.2 paragraph 8.2.2 for further testing frequency guidelines.

Prior to testing, the Versalift should be inspected for dirt, water, or any other contamination that might bridge the insulated sections. Make the necessary corrections to prevent bridging before proceeding to the dielectric tests.

**WARRANTY REGISTRATION** - The Warranty Registration Card is an important part of your **Versalift** package. Fill in the requested information and return the card to **Time Manufacturing Company**. Of particular importance is the date your **Versalift** is put in service thus initiating the proper warranty period. This information also helps **Time Manufacturing Company** send important correspondence to you concerning your specific **Versalift**.

**PREDELIVERY CHECKLIST** - After the mounting of the **Versalift** is complete, check the following items.

- ( ) All bolts are torqued properly.
- ( ) Mounting hardware is installed properly and bolts torqued.
- ( ) All hoses and electrical wires are secured.
- ( ) Hoses and wires are properly protected.
- ( ) All welding has been completed.
- ( ) The stabilizer system is securely mounted and works properly.
- ( ) The platform mounting bolts are tight.
- ( ) All decals are positioned on the lift and truck and are legible.
- ( ) Tire pressure is correct.
- ( ) There are no visible defects or loose objects on the **Versalift** or the truck.
- ( ) There are no hoses near the exhaust system or the drive line.
- ( ) Belt pump operates properly (Belt Drive option).
- ( ) Stability test performed.
- ( ) Throttle control (optional) is operational and properly adjusted.
- ( ) PTO operates properly (PTO drive option).
- ( ) All boom actuation speeds are within the specified time ranges.
- ( ) Engine start/stop is operational and properly adjusted.

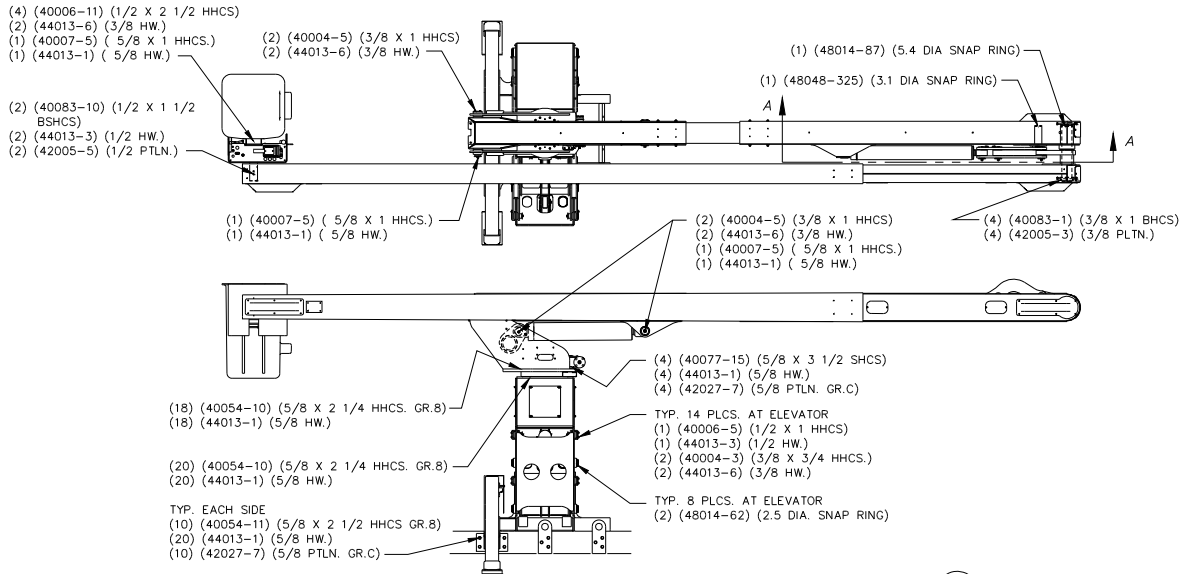
- ( ) Hydraulic system has no leaks.
- ( ) Platform levels properly.
- ( ) Platform override control selector switch operates properly.
- ( ) Emergency power (optional) operates properly.
- ( ) Continuous rotation (optional) operates properly.
- ( ) Hydraulic hoses are not stretched too tight or kinked as the booms are actuated.
- ( ) All controls operate smoothly and perform the functions indicated on the decal.
- ( ) Tool power circuit operates properly.
- ( ) Hydraulic oil reservoir is full.
- ( ) All boom movements are smooth and quiet.
- ( ) All optional equipment operates properly.
- ( ) Warranty Registration properly completed and mailed.
- ( ) Qualification electrical test has been performed.

**By:** \_\_\_\_\_

**Date:** \_\_\_\_\_

INSTALLATION

# CRITICAL FASTENERS/WELDS



## NOTES:

- 1.) ALL FASTENERS THAT ARE STRUCTURAL OR RETAIN ANOTHER STRUCTURAL MEMBER ARE CRITICAL.
- 2.) HEX HEAD BOLTS ARE GRADE 5, NUTS ARE GRADE B, AND WASHERS ARE HARDENED STEEL UNLESS OTHERWISE NOTED.
- 3.) MINIMUM OF TWO THREADS THROUGH ANY LOCKNUT.
- 4.) FASTENER CALLOUTS READ AS FOLLOWS:  
(QTY. PER ARROWHEAD) (PART NO.) (DESCRIPTION).
- 5.) TORQUE: ALL CRITICAL FASTENERS PER THE TORQUE CHART "TMC-778" IN THE OPERATORS AND SERVICE MANUALS, UNLESS OTHERWISE NOTED.
- 6.) ALL THREADED CRITICAL FASTENERS TO BE MARKED WITH TORQUE SEAL TO PROVIDE INDICATION OF TURNING.
- 7.) ABBREVIATIONS:  
HHCS = HEX HEAD CAP SCREW  
SHCS = SOCKET HEAD CAP SCREW  
BHCS = BUTTON HEAD CAP SCREW  
HW = HARDENED WASHER  
PTLN = PREVAILING TORQUE LOCKNUT

UNLESS OTHERWISE NOTED:  
 TOLERANCES: FRACTIONS  $\pm 1/16$  DECIMALS  $\pm .01$   
 ANGLES  $\pm 1^\circ$   $\pm .03$   
 MACHINED SURFACE FINISHES =  $125$   
 ALL DIMENSIONS ARE IN INCHES  
 PROJECTION OF VIEWS  $\odot$   $\square$   
 THIS PRINT CONTAINS CONFIDENTIAL INFORMATION AND IS SOLE PROPERTY OF TIME MANUFACTURING, AND IS NOT TO BE DISCLOSED, COPIED, OR REPRODUCED WITHOUT EXPRESSED PERMISSION OF TIME MANUFACTURING.



MANUFACTURING  
 COMPANY  
 WACO TEXAS

DWN. BY DATE  
 LBR 9-26-08  
 SIZE A SCALE 1=55

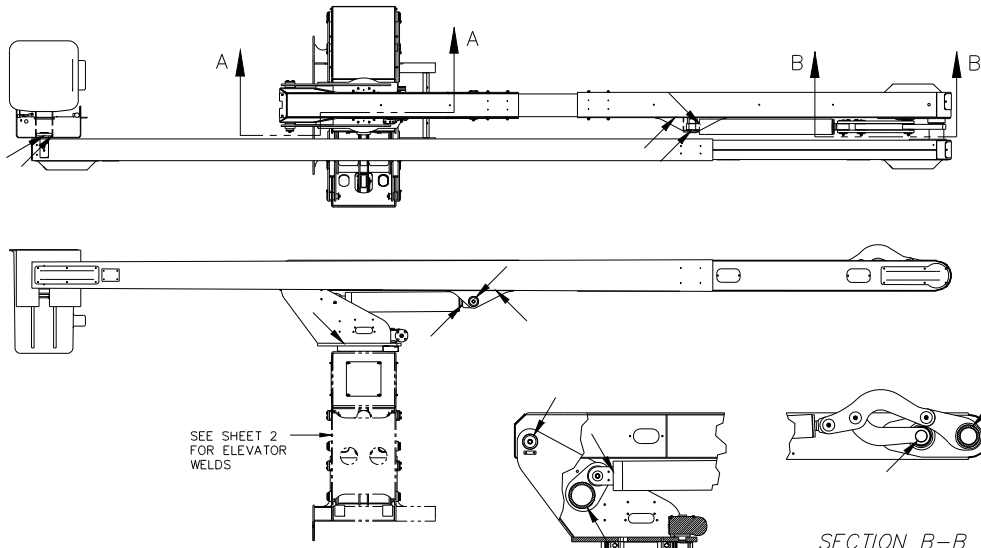
TITLE  
 VO265E/270E  
 CRITICAL  
 FASTENERS

EST WT # MANUAL  
 -

SHEET 1 OF 1

DWG. NO.  
 34034-DWG

INSTALLATION



## NOTES:

- 1.) CRITICAL WELDED JOINTS TO BE INSPECTED ARE INDICATED BY ARROWS. THE JOINTS MAY INCLUDE WELDS ON BOTH SIDES OR INSIDE AND OUTSIDE AS APPLICABLE.
- 2.) THERE ARE ADDITIONAL CRITICAL WELDS ON THE MOUNTING HARDWARE AND OUTRIGGERS.
- 3.) ALL WELDED PIN RETAINERS ARE CRITICAL WELDS.
- 4.) ANY STRUCTURAL WELD FOUND DEFECTIVE SHOULD BE CORRECTED AND NEVER IGNORED. WELDS MUST BE REPAIRED IN ACCORDANCE WITH ANSI A92.2 REQUIREMENTS. CONSULT FACTORY FOR MATERIAL SPECIFICATIONS AND PROPER WELDING SPECIFICATIONS.

UNLESS OTHERWISE NOTED:  
 TOLERANCES: FRACTIONS  $\pm 1/16$  DECIMALS  $\pm .01$   
 ANGLES  $\pm 1^\circ$   $\pm .03$   
 MACHINED SURFACE FINISHES =  $125$   
 ALL DIMENSIONS ARE IN INCHES  
 PROJECTION OF VIEWS  $\odot$   $\square$   
 THIS PRINT CONTAINS CONFIDENTIAL INFORMATION AND IS SOLE PROPERTY OF TIME MANUFACTURING, AND IS NOT TO BE DISCLOSED, COPIED, OR REPRODUCED WITHOUT EXPRESSED PERMISSION OF TIME MANUFACTURING.



MANUFACTURING  
 COMPANY  
 WACO TEXAS

DWN. BY DATE  
 LBR 9-26-08  
 SIZE A SCALE 1=50

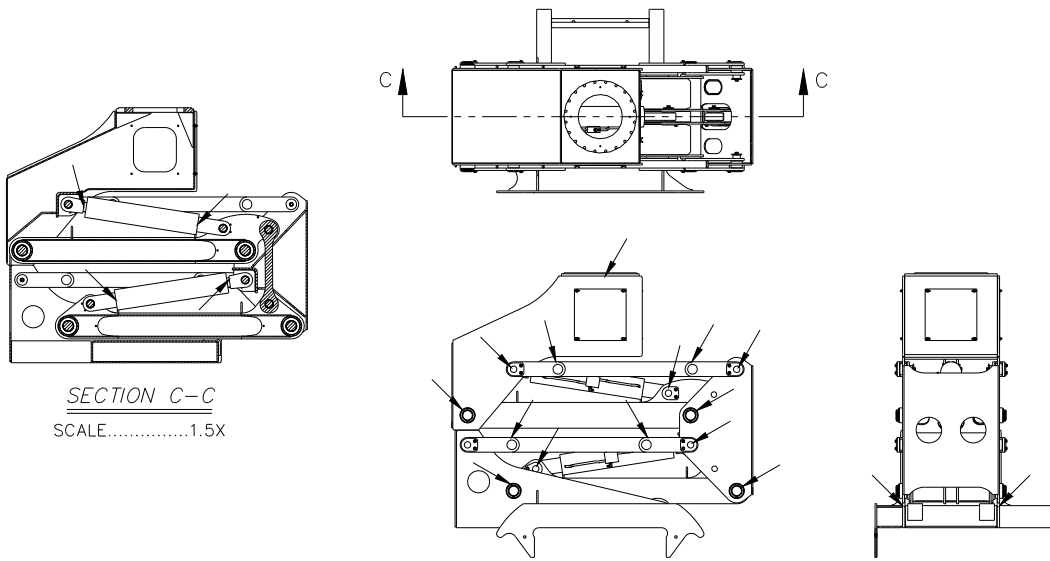
TITLE  
 VO265E/270E  
 CRITICAL  
 WELDS

EST WT # MANUAL  
 -

SHEET 1 OF 2

DWG. NO.  
 34033-DWG

REV.



SECTION C-C  
 SCALE.....1.5X

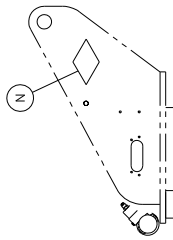
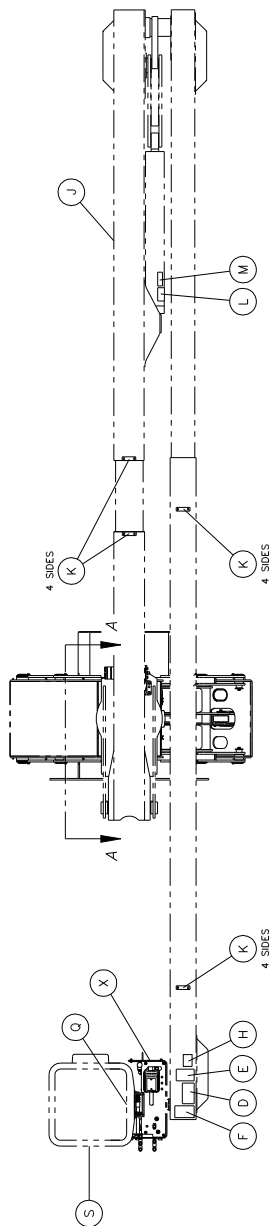
ELEVATOR WELDS  
 SCALE.....1.5X

UNLESS OTHERWISE NOTED: TOLERANCES: DECIMALS FRACTIONS $\pm \frac{1}{16}$ X $\pm .1$ ANGLES $\pm 1^\circ$ .XX $\pm .03$ .XXX $\pm .005$ MACHINED SURFACE FINISHES $\geq 125$ PROJECTION OF VIEWS ALL DIMENSIONS ARE IN INCHES	 MANUFACTURING COMPANY WACO TEXAS	OWN. BY	DATE	TITLE VO265E/270E CRITICAL WELDS
		LBR	9-26-08	
		SIZE	SCALE	
		A	1=50	
THIS PRINT CONTAINS CONFIDENTIAL INFORMATION AND IS SOLE PROPERTY OF TIME MANUFACTURING, AND IS NOT TO BE DISCLOSED, COPIED, OR REPRODUCED WITHOUT EXPRESSED PERMISSION OF TIME MANUFACTURING.	MATERIAL FINISH	EST WT #	MANUAL	DWG. NO. 34033-DWG
		SHEET	2 OF 2	

INSTALLATION

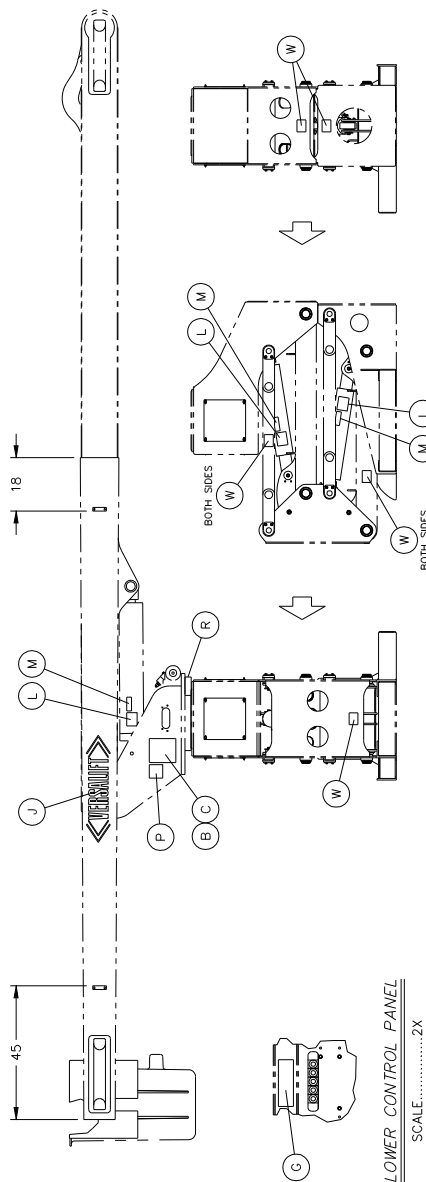
## INSTALLATION

## DECAL PLACEMENT



VIEW A-A

SCALE.....1.5X



LOWER CONTROL PANEL

SCALE.....2X

[illegible]

UNLESS OTHERWISE NOTED:  
TOLERANCES: DECIMALS  
FRACTIONS: ± 1/16  
ANGLES: ± .03  
          XX ± .005  
          XXX ± .005  
MACHINED SURFACE FINISHES = 125  
PROJECTION OF VIEWS  
ALL DIMENSIONS ARE IN INCHES  
THIS PRINT CONTAINS CONFIDENTIAL  
INFORMATION AND IS SOLE PROPERTY  
OF TIME MANUFACTURING, AND IS NOT  
TO BE DISCLOSED, COPIED, OR  
REPRODUCED WITHOUT EXPRESSED  
PERMISSION OF TIME MANUFACTURING.

[illegible]

NOTES:

- 1.) \* INDICATES PARTS TO BE SHIPPED LOOSE.
- 2.) ITEM "V" TO BE MOUNTED FRONT, REAR AND EACH SIDE OF CHASSIS.
- 3.) ITEM "U" TO BE MOUNTED NEAR RELIEF VALVE.
- 4.) ITEMS "D," "E," AND "F" ARE TO BE LOCATED ON BODY PANELS NEAR LOWER CONTROL PANEL.



REV	DESCR	BY	CHKD	APPR	DATE
58025	ITEMS "B" WAS 14408-1, ITEM "C" WAS 14409-1, ITEM "M" WAS 34258-1, ITEM "P" WAS 34259-1	KCM	DJH	SKV	11/13/09

DASH NO.	DESCRIPTION	CODE
-1	DECAL KIT UPPER CNTRL S-STK BTWN BM AND BKT V0255/260REV-02	DE-1330-9
-2	DECAL KIT UPPER CNTRL S-STK BTWN BM AND BKT V0255/260REAR-02	DE-1330-10
-3	DECAL KIT UPPER CNTRL S-STK BTWN BM AND BKT V0265E/270EREV	DE-1330-11
-4	DECAL KIT UPPER CNTRL S-STK BTWN BM AND BKT V0265E/270REAR	DE-1330-12
-5	DECAL KIT UPPER CNTRL S-STK BTWN BM AND BKT WITH PLATFORM TILT	DE-1330-13
-6	HR DECAL KIT UPPER CNTRL S-STK BTWN BM AND BKT V0255/260REV-02	DE-1330-16
-7	HR DECAL KIT UPPER CNTRL S-STK BTWN BM AND BKT V0255/260REAR-02	DE-1330-17
-8	HR DECAL KIT UPPER CNTRL S-STK BTWN BM AND BKT V0265E/270EREV	DE-1330-18
-9	HR DECAL KIT UPPER CNTRL S-STK BTWN BM AND BKT V0265E/270REAR	DE-1330-19

-9	-8	-7	-6	-5	-4	-3	-2	-1			
1	-	1	-	-	-	-	-	-	P	34258-1	HR DECAL, S-STK CNTRL (LH)
-	1	-	1	-	-	-	-	-	N	34259-1	HR DECAL, S-STK CNTRL (RH)
REF	REF	REF	REF	-	REF	REF	REF	REF	M	-	DECAL, EMERGENCY POWER
REF	REF	REF	REF	-	REF	REF	REF	REF	L	-	DECAL, ENGINE
REF	REF	REF	REF	-	REF	REF	REF	REF	K	-	DECAL, THROTTLE
-	-	-	-	1	-	-	-	-	J	15737-1	DECAL, DANGER PLATFORM TILT
1	1	1	1	-	1	1	1	1	H	26855-1	DECAL, TOOL SELECT
1	1	1	1	-	1	1	1	1	G	12340-1	DECAL, CONDUCTIVE HOSES
1	1	1	1	-	1	1	1	1	F	13366-1	DECAL, TOOL PRESSURE
1	1	1	1	-	1	1	1	1	E	8285-1	DECAL, EMERGENCY STOP
1	1	-	-	-	1	1	-	-	D	33877-1	DECAL, ELEVATOR
-	-	-	-	-	1	-	1	-	C	14408-1	DECAL, S-STK CNTRL (LH)
-	-	-	-	-	-	1	-	1	B	14409-1	DECAL, S-STK CNTRL (RH)
1	1	1	1	1	1	1	1	1	A	33988-DWG	DECAL KIT UPPER CNTRL S
QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	ITEM	PART NO.	DESCRIPTION

UNLESS OTHERWISE NOTED:		TOLERANCES: DECIMALS	
FRACTIONS: 1/16, 1/8, 1/4, 1/2, 3/4, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 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1842, 1843, 1844, 1845, 1846, 1847, 1848, 1849, 1850, 1851, 1852, 1853, 1854, 1855, 1856, 1857, 1858, 1859, 1860, 1861, 1862, 1863, 1864, 1865, 1866, 1867, 1868, 1869, 1870, 1871, 1872			

## VO-265E/270E REVERSE MOUNT MINIMUM VEHICLE SPECIFICATIONS

Frame Section Modulus ..... 18 in.<sup>3</sup> (295 cm<sup>3</sup>)  
Frame Resisting Bending Moment ..... 900,000 in.-lbs. (101,700 N-m)  
Cab to Rear Axle Dimension ..... 138 in. (3.5 m)

### With One Set of A-Frame Outriggers behind Cab

GVWR ..... 32,000 lbs. (14500 kg)  
GAWR (FRONT) ..... 13,000 lbs. (5900 kg)  
GAWR (REAR) ..... 19,000 lbs. (8620 kg)  
Approximate Curb Weight for Stability ..... 20,000 lbs. (9100 kg)

## VO-265E/270E REAR MOUNT MINIMUM VEHICLE SPECIFICATIONS

Frame Section Modulus ..... 15 in.<sup>3</sup> (245 cm<sup>3</sup>)  
Frame Resisting Bending Moment ..... 750,000 in.-lbs. (85,000 N-m)  
Cab to Rear Axle Dimension ..... 102 in. (2.59 m)


### With Two Sets of A-Frame Outriggers and Full Length Subframe


GVWR ..... 29,000 lbs. (13200 kg)  
GAWR (FRONT) ..... 10,000 lbs. (4540 kg)  
GAWR (REAR) ..... 19,000 lbs. (8620 kg)  
Approximate Curb Weight for Stability ..... 20,000 lbs. (9100 kg)

#### Notes:

1. Actual GVWR and GAWR'S should be based on the weight and weight distribution of the chassis, body, lift ballast (if required), and accessories, plus the desired payload.
2. Curb weight for stability will vary based on rated platform capacity, mounting configuration, frame stiffness, and stability test requirements.


[illegible]


UNLESS OTHERWISE NOTED:  
TOLERANCES: DECIMALS  
FRACTIONS  $\pm 1/16$  .X  $\pm .1$   
ANGLES  $\pm 1^\circ$  .XX  $\pm .03$   
XXX  $\pm .005$   
MACHINED SURFACE FINISHES =  $125/\sqrt{R}$   
PROJECTION OF VIEWS   
ALL DIMENSIONS ARE IN INCHES  
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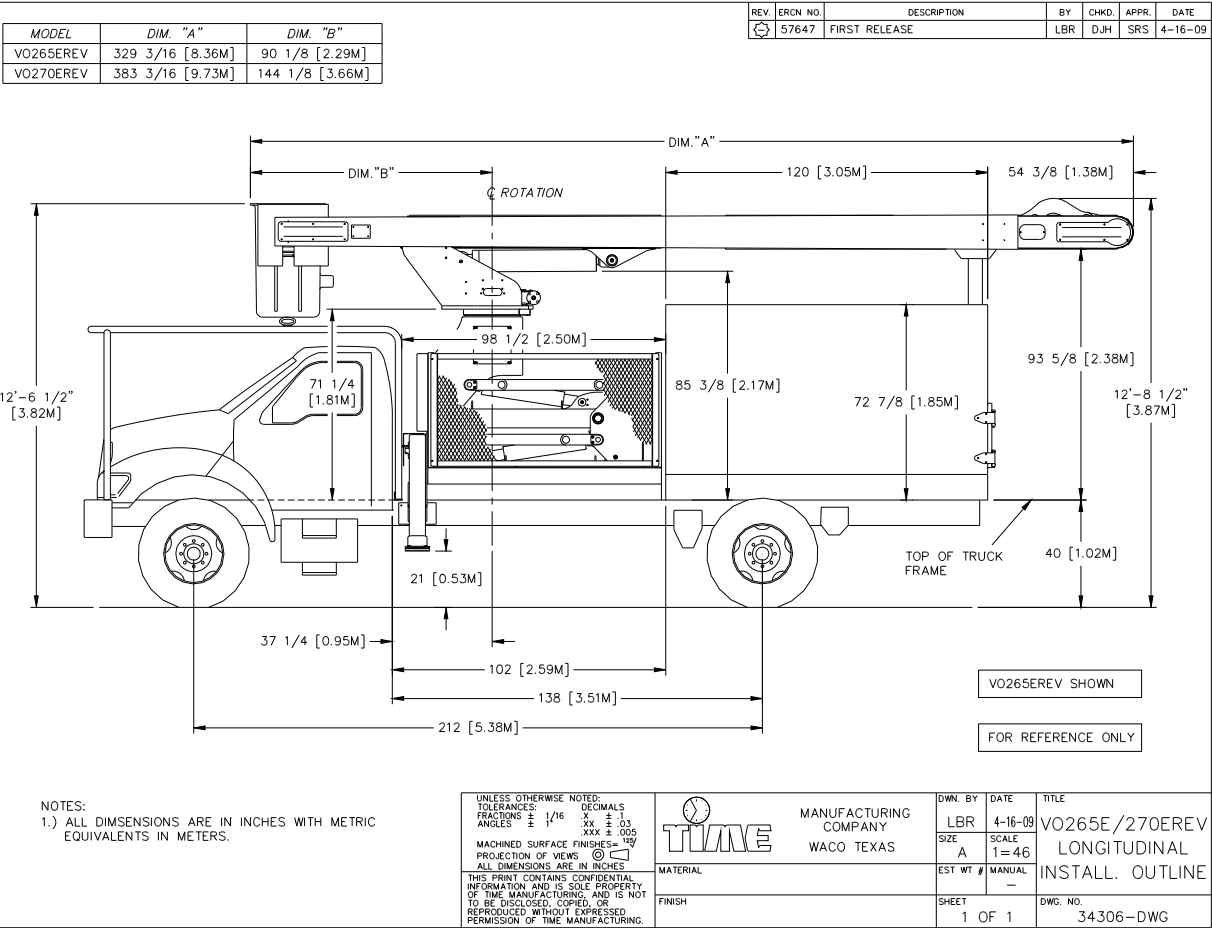
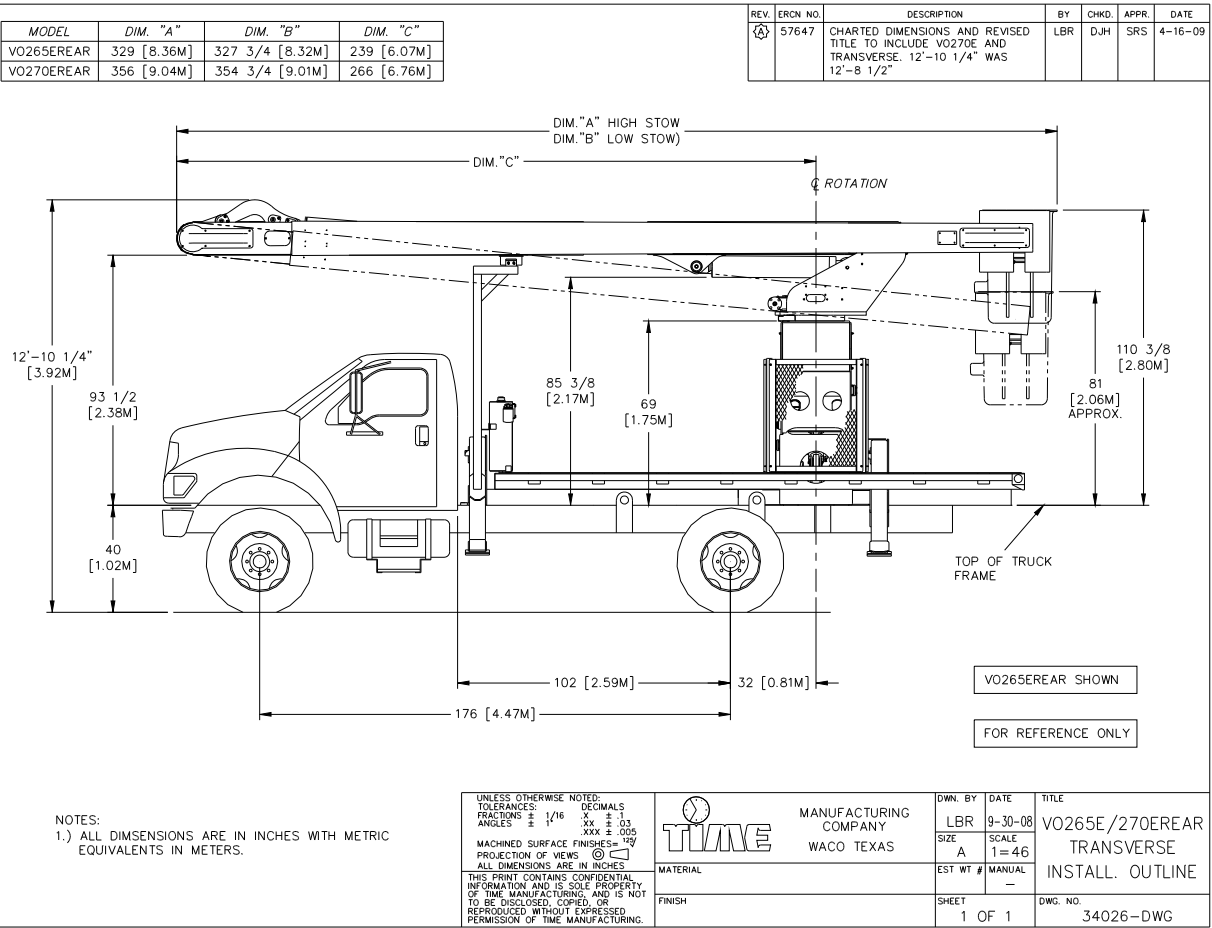
	MANUFACTURING COMPANY WACO TEXAS	DWN. BY	DATE	TITLE  VO265EREV INSTALLATION OUTLINE
		LBR SIGNATURE A	9-26-08 SCALE 1"=46"	
MATERIAL		EST WT #	MANUAL	
FINISH		SHEET	DWG. NO.	
		1 OF 1	34027-DWG	

Technical drawing of a truck-mounted crane showing dimensions in feet/inches and meters. The drawing includes the following dimensions:

- Overall length: 383 3/16 [9.73M]
- Distance from front axle to crane center: 144 1/8 [3.66M]
- Distance from crane center to rear axle: 146 [3.71M]
- Distance from rear axle to crane center: 58 9/16 [1.49M]
- Crane height at rear axle: 93 1/2 [2.38M]
- Crane height at front axle: 72 7/8 [1.85M]
- Crane height at truck frame: 40 [1.02M]
- Crane height at truck frame (top): 12'-9" [3.89M]
- Crane height at truck frame (bottom): 12'-6" [3.81M]
- Crane height at truck frame (middle): 71 1/8 [1.81M]
- Crane height at truck frame (top): 85 5/16 [2.17M]
- Crane height at truck frame (bottom): 64 [1.63M]
- Crane height at truck frame (middle): 21 [0.53M]
- Crane height at truck frame (top): 33 [0.84M]
- Crane height at truck frame (bottom): 67 1/2 [1.71M]
- Crane height at truck frame (middle): 74 [1.88M]
- Crane height at truck frame (top): 138 [3.51M]
- Crane height at truck frame (bottom): 212 [5.38M]

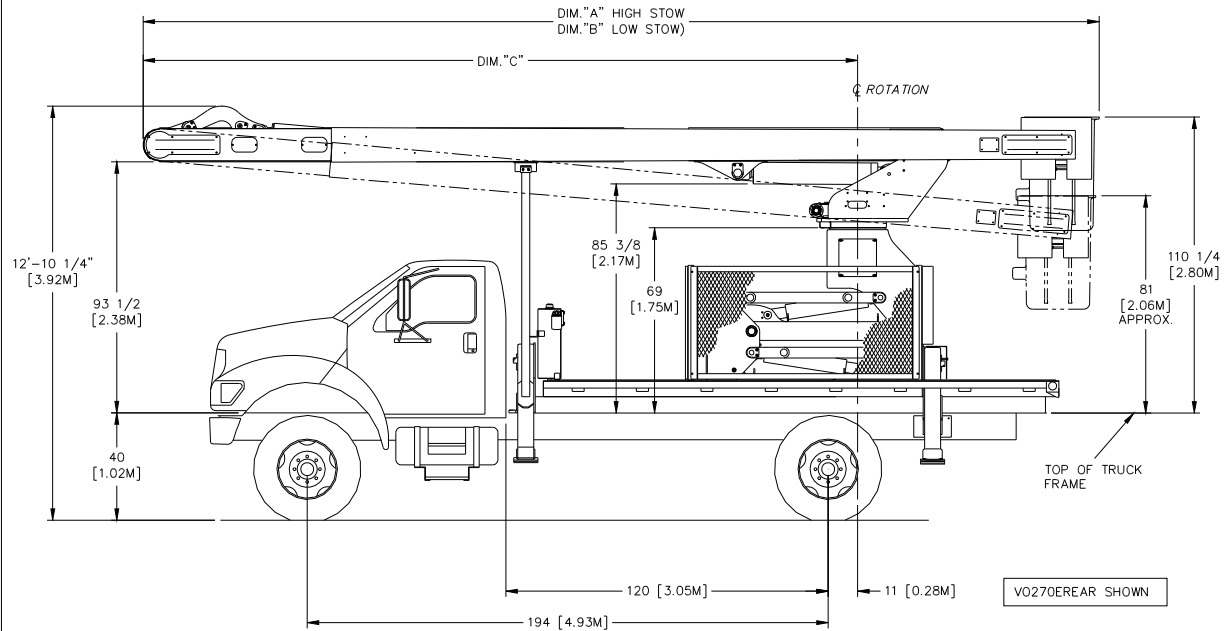
UNLESS OTHERWISE NOTED:  
TOLERANCES: DECIMALS  
FRACTIONS  $\pm 1/16$  .X  $\pm .1$   
ANGLES  $\pm 1^\circ$  .XX  $\pm .03$   
XXX  $\pm .005$   
MACHINED SURFACE FINISHES =  $125/\sqrt{\text{R}}$   
PROJECTION OF VIEWS   
ALL DIMENSIONS ARE IN INCHES  
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	MANUFACTURING COMPANY WACO TEXAS	DWN. BY	DATE	TITLE  VO270EREV INSTALLATION OUTLINE
		SIZE 1/8" x 1/8" x 1/8"	R 9-26-08 SCALE 1" = 46'	
MATERIAL		EST WT #	MANUAL	
FINISH		SHEET	DWG. NO.	
		1 OF 1	34028-DWG	



MODEL	DIM. "A"	DIM. "B"	DIM. "C"
VO265EREAR	329 [8.36M]	327 3/4 [8.32M]	239 [6.07M]
VO270EREAR	356 [9.04M]	354 3/4 [9.01M]	266 [6.76M]

REV.	ERON NO.	DESCRIPTION	BY	CHKD.	APPR.	DATE
57647	FIRST RELEASE		LBR	DJH	SRS	4-16-09



NOTES:  
1.) ALL DIMENSIONS ARE IN INCHES WITH METRIC EQUIVALENTS IN METERS.

UNLESS OTHERWISE NOTED:  
TOLERANCES:  
FRACTIONS  $\pm 1/16$  DECIMALS  
X  $\pm .01$   
XX  $\pm .03$   
XXX  $\pm .05$   
ANGLES  $\pm 1^\circ$   
MACHINED SURFACE FINISHES  $\sqrt{32}$   
PROJECTION OF VIEWS  $\odot$   
ALL DIMENSIONS ARE IN INCHES  
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**TIME**  
MANUFACTURING  
COMPANY  
WACO TEXAS

DWN. BY	DATE	TITLE
LBR	4-16-09	VO265E/270EREAR LONGITUDINAL INSTALL. OUTLINE
SIZE A	SCALE 1=46	
EST WT #	MANUAL	
SHEET 1 OF 1	DWG. NO. 34244-DWG	

INSTALLATION

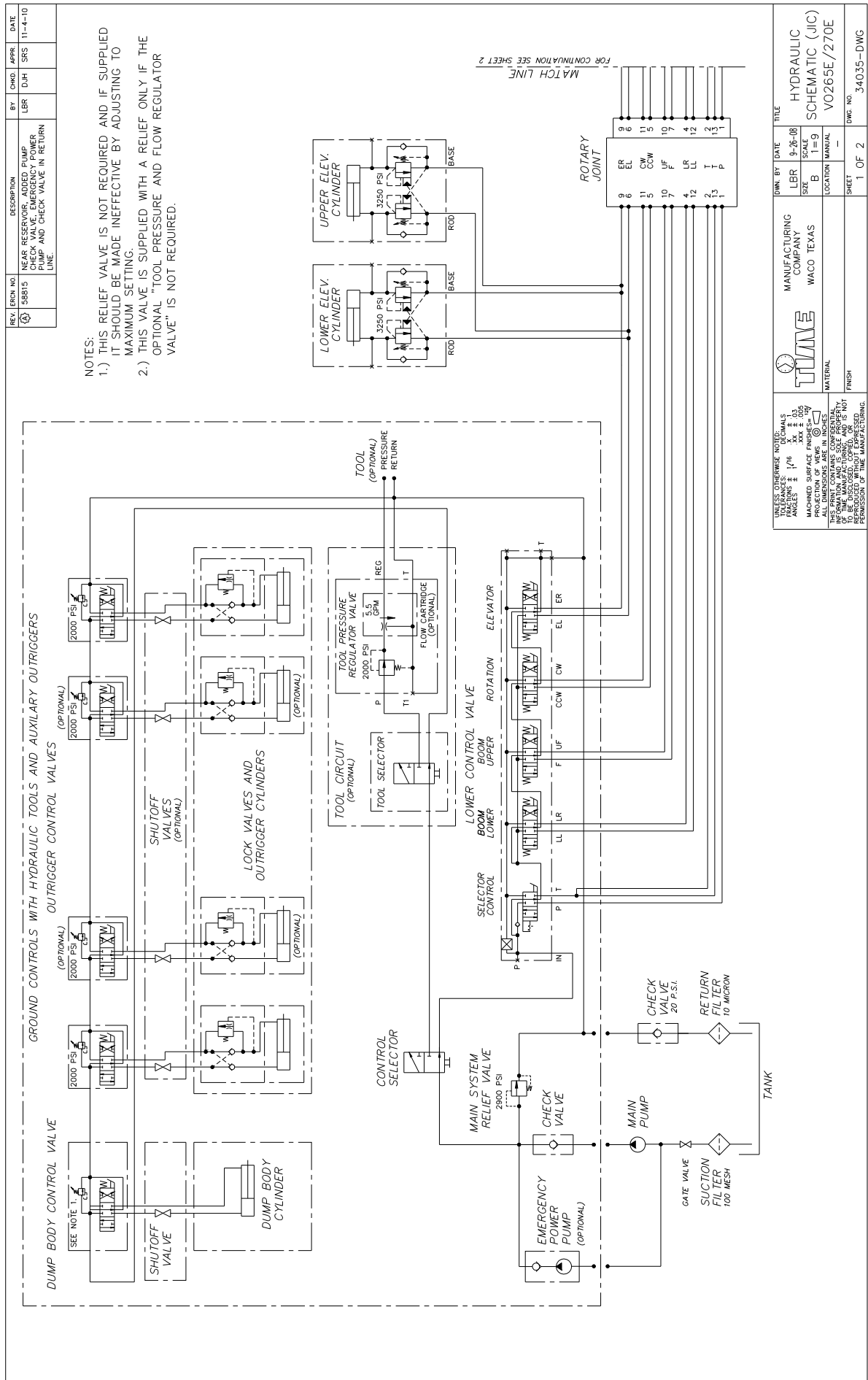


## **SECTION 105 HYDRAULIC SCHEMATICS**

**HYD. SCHEMATICS**

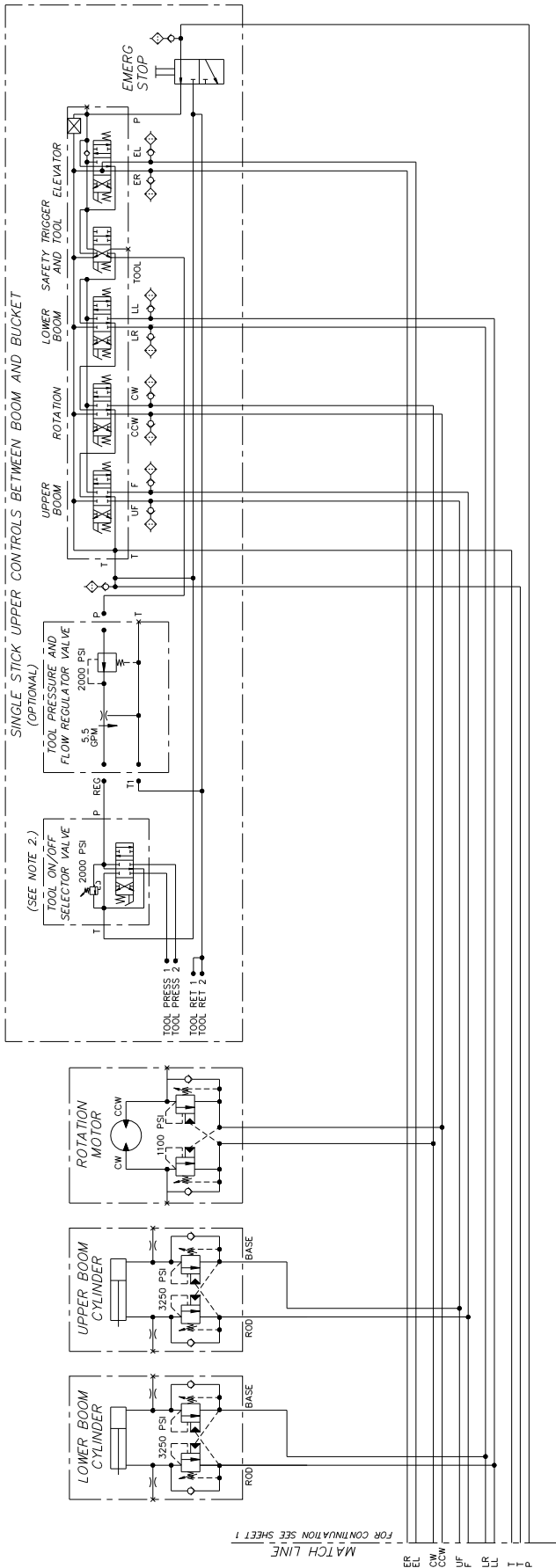
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## HYD. SCHEMATICS



HYD. SCHEMATICS

REV



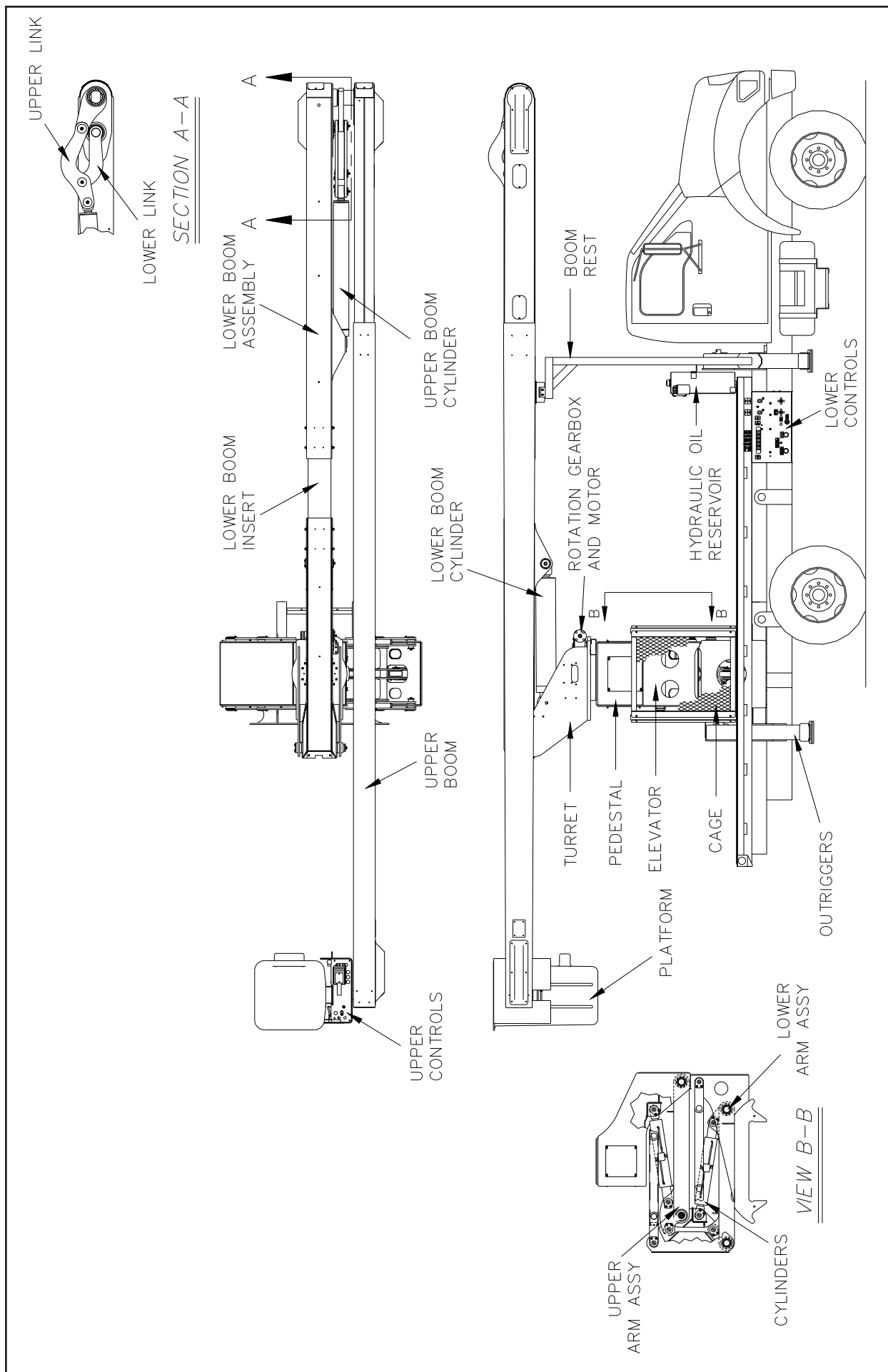
<div>UNLESS OTHERWISE NOTED: TOLERANCES: DIMENSIONS ± .005 ANGLES ± 1°/16" MACHINED SURFACE FINISHES = 125 PROJECTION OF VIEWS THIS PRINT CONTAINS CONFIDENTIAL INFORMATION AND IS NOT TO BE REPRODUCED OR REPRODUCED WITHOUT EXPRESS PERMISSION OF TIME MANUFACTURING.</div>	<div>TIME</div>	<div>MANUFACTURING COMPANY WACO TEXAS</div>	<div>OWN BY DATE LBR 9-26-08</div>	<div>TITLE HYDRAULIC SCHEMATIC (JIC) VO265E/270E</div>
<div>MATERIAL FINISH</div>	<div>LOCATION MANUAL —</div>	<div>SCALE 1=9</div>	<div>SHEET 2 OF 2</div>	<div>DWG. NO. 34035-DWG</div>



## **SECTION 106 PARTS AND ASSEMBLIES (Parts Location and Ordering)**

**Confirm part numbers in “As Built Section”  
located in the back of this manual.**

## PARTS LOCATION DETAIL



## PART ORDERING AND PRODUCT SUPPORT INFORMATION

The following sections contains replacement parts information for the **VERSALIFT** Aerial Device, including normal available options.

Your cooperation in furnishing as much information as possible will assist us in filling your orders correctly and in the shortest possible time.

### When ordering parts always furnish:

1. **Identification of the Lift** - Model and serial number of the lift are located on the data plate. The serial number can also be found stamped on the turret base plate and/or pedestal top plate.
2. **Part Numbers and Description** - Each part ordered needs to have correct part number and description. The part numbers and descriptions can be found on following pages in this section.

An Itemized parts list with illustration is included for each assembly, hydraulic circuit, control system and electrical circuit. All parts are identified by a reference letter corresponding to a like letter in the parts list (see assembly identification example 1 on the following page).

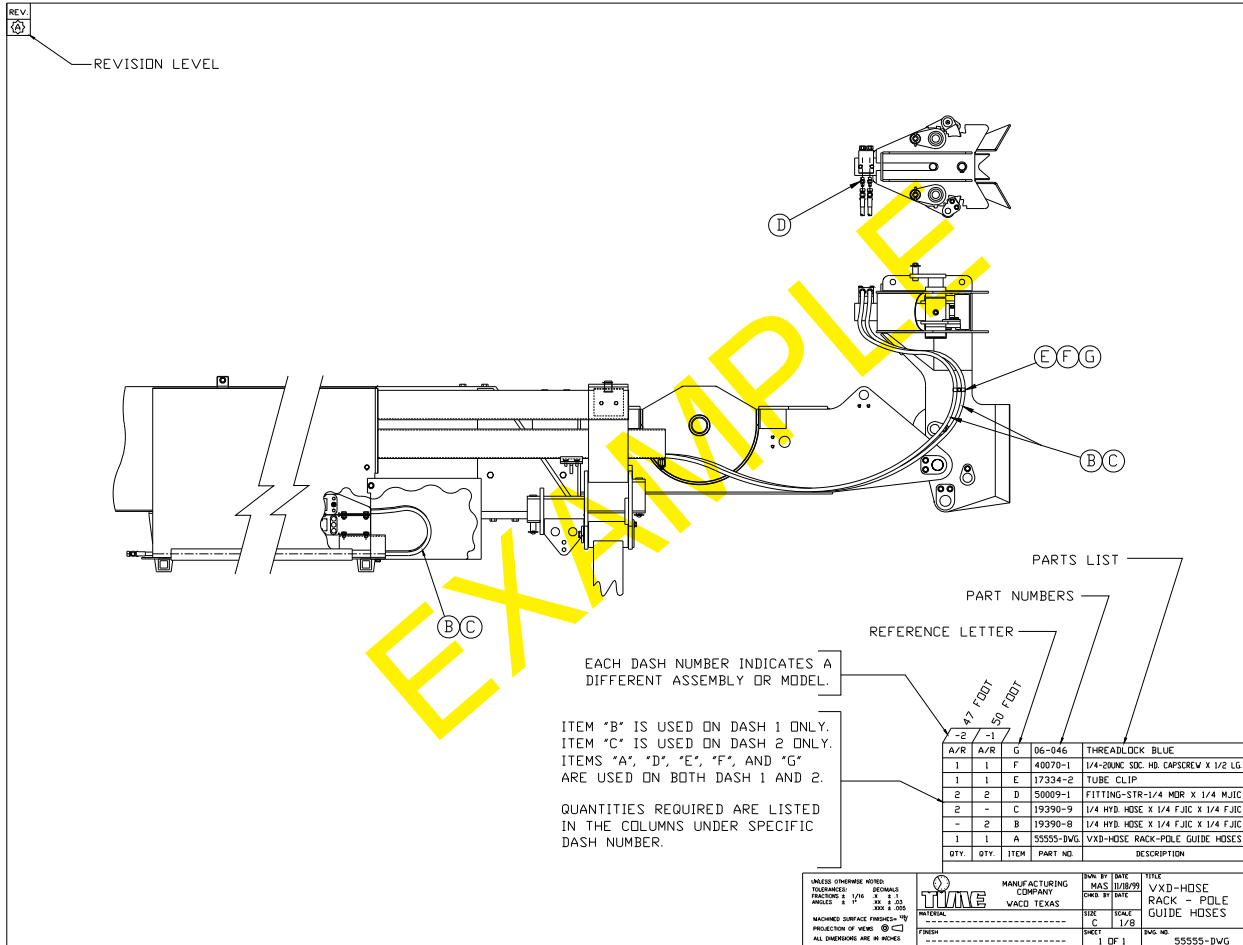
An itemized service parts list with illustration is included for each major component. All parts are identified by a reference number corresponding to a like number in the service parts list (see component identification example 2 on the following page). The quantities listed are the amount required for one complete assembly or subassembly.

If there is any doubt as to the correct part numbers, please contact your local distributor or the customer service department at Time Manufacturing Company.

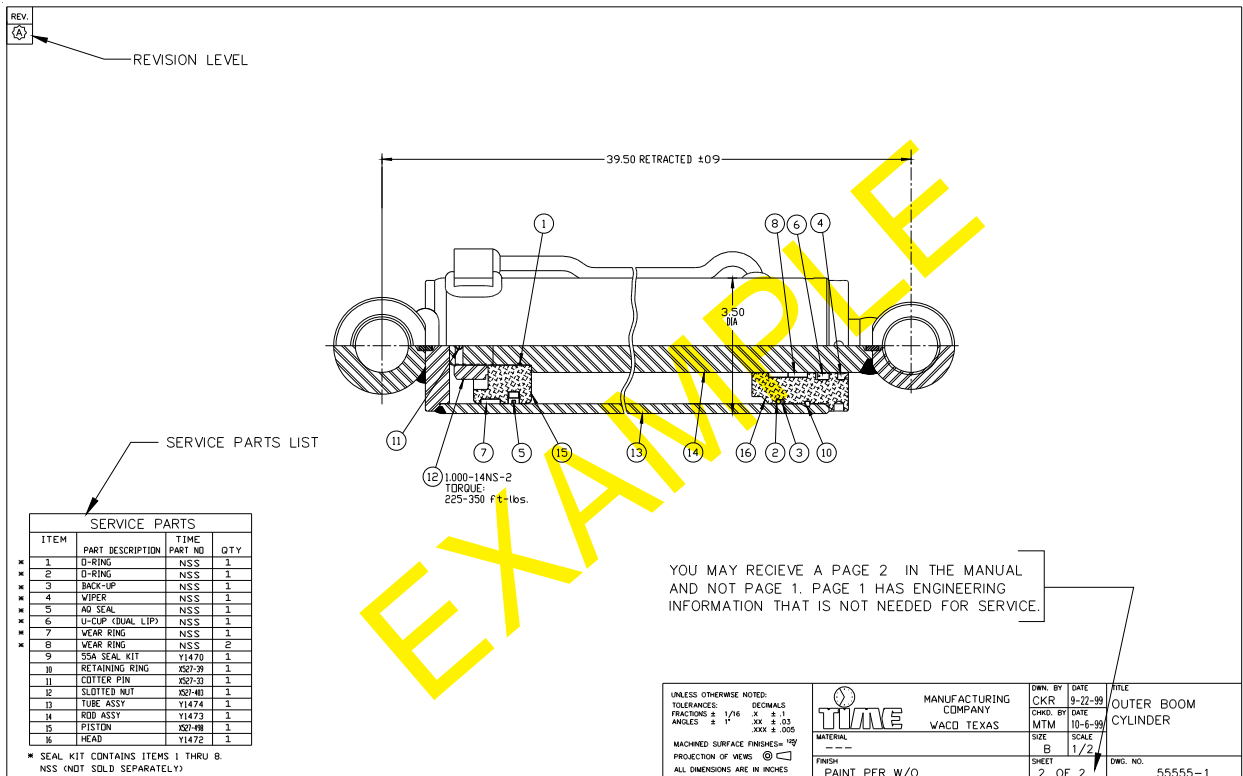
3. **Shipping Method** - Unless otherwise instructed, all shipments will be made via motor freight collect or UPS prepaid and charged on our invoice.
4. **Returns** - Any parts that may need to be returned must have a return goods authorization number on the outside of the box, and the correct paperwork including the invoice number or purchase order number accompanying the part.

**Replacement Parts** - All parts are original VERSALIFT replacement component. Authorized VERSALIFT dealers are assured of being furnished with authentic parts when purchased from Time Manufacturing Company. Dealers and customers not using original replacement parts from VERSALIFT may experience operational and safety related premature fatigue, wear, and/or failure of components.

**NOTE:** On some Assembly and Installation drawings included in the following sections, some components are marked as shipped loose items. These items will require installation during the Versalift installation procedure. Refer to any component identification instructions in the ship loose box. Also refer to the Part Details and Installation drawings in this manual for any additional information needed.



## ASSEMBLY IDENTIFICATION EXAMPLE 1



## COMPONENT IDENTIFICATION EXAMPLE 2

## **Section 107-Blue Boot for Air Cylinders (SD-1200-22)**

Air Cylinder Boot..... 107-2

## **Section 108-Decal Placement VO270E (DE-1330-24)**

Decal Placement..... 108-2

## **Section 109-Outrigger Control Decals (DE-1400-4)**

Outrigger Control Decals..... 109-2

## **Section 110-Decal Kit Upper Controls S-Stk Btwn Boom & Bucket (DE-1330-18)**

Decal Kit Upper Controls Btwn Boom & Bucket..... 110-2

## **Section 111-Emergency Power Insulated 12VDC (EP-1340-1)**

Emergency Power Installation..... 111-3

## **Section 112-Prep Kit Air Operated Platform Controls (CC-1330-5)**

Prep Kit For Platform Controls..... 112-2

## **Section 113-Boom Hose Kit (HK-1330-17)**

Boom Hose Kit..... 113-3

## **Section 114-Lower Control Panel (HYD-1330-11)**

Lower Control Panel Assembly..... 114-2

## **Section 115-Cylinders Assembly (HYD-1330-5)**

Cylinders Assembly..... 115-2

## **Section 116-Knuckle Linkage Assembly (KN-1330-1)**

Knuckle Linkage Assembly..... 116-2

## **Section 117-Lower Boom Assembly (LB-1330-1)**

Lower Boom Assembly..... 117-2

## **Section 118-Valve Kit Lower Controls (HYD-1330-6)**

Valve Kit Lower Controls..... 118-3

## **Section 119-Leveling System (LO-1330-2)**

Leveling System Assembly..... 119-2

## **Section 120-Lower Boom Rest, Sled Only (MH-1330-9)**

Lower Boom Rest Installation..... 120-2

## **Section 121-Upper Boom Rest (MH-812)**

Upper Boom Rest..... 121-2

## **Section 122-Platform Support SS Btwn Boom & Bucket W/ Pltfm Tilt Rev Mt (PS-1330-12)**

Platform Support Assembly..... 122-3

**Section 123-HR S-Stk Ctrls Rev Mt Btwn Bm & Bkt w/ Reg Tool Press/Flow  
(SC-1330-37)**

HR S-Stk Ctrls Btwn Boom & Bucket Rev Mt Elevator.....	123- 2
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**Section 124-Slope Indicator Installation (SD-1200-13)**

Slope Indicator Installation.....	124-2
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**Section 125-Upper Boom Assembly (UB-1330-2)**

Upper Boom Assembly.....	125- 3
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**Section 126-Turret Assembly (TT-1330-1)**

Turret Assembly.....	126-2
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**Section 127-Longitudinal Elevator Assembly (E-1330-3)**

Longitudinal Elevator Assembly.....	127-3
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**Section 128-Elevator Hose Kit (HK-1330-18)**

Elevator Hose Kit.....	128-3
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**Section 129-Elevator Mounting Hardware (MH-1330-10)**

Elevator Mounting Hardware.....	129-2
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**Section 130-Outrigger Assembly (OR-1400-49)**

Outrigger Assembly (Pivot Foot).....	130-3
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**Section 131-Outrigger Pin Option (OR-1400-9)**

Outrigger Pin Option.....	131-2
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**Section 132-Continuous Rotation Assembly (RO-1330-2)**

Continuous Rotation Assembly.....	132-2
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**Section 133-One Outrigger Valve W/ Relief & Switch (VK-1400-21)**

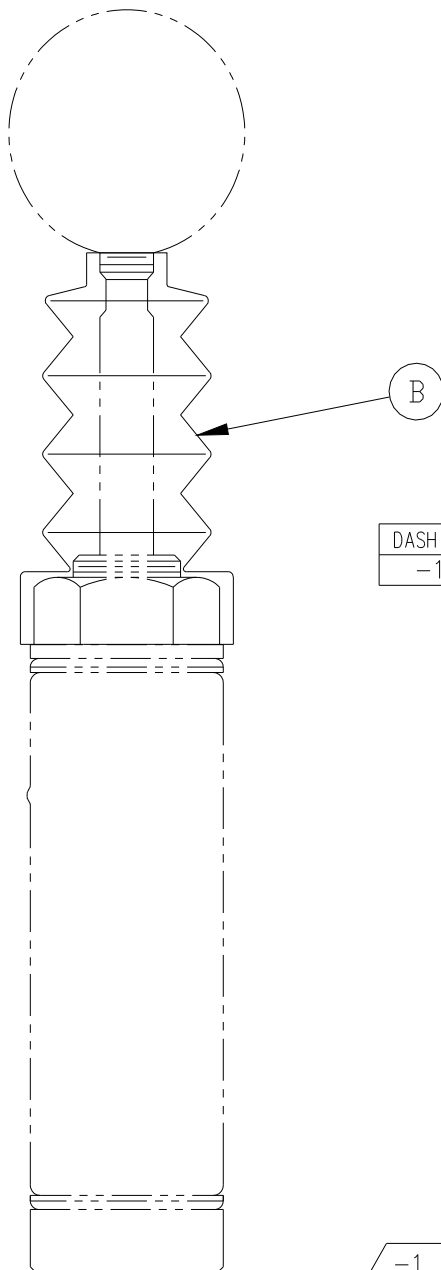
Outrigger Control Valve Kit W/ Relief.....	133-2
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## SECTION 107

### BLUE BOOT FOR AIR CYLINDERS (OPTION SD-1200-22)

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.


REV.



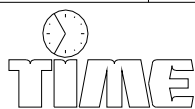
DASH NO.	DESCRIPTION	OPTION
-1	BLUE BOOT FOR AIR CYLINDERS	SD-1200-22

BLUE BOOT FOR AIR CYLINDERS

-1			
1	B	34174-1	RUBBER BOOT, AIR CYLINDER
1	A	35890-DWG	BOOT, AIR CYLINDER
QTY.	ITEM	PART NO.	DESCRIPTION
LIST OF MATERIAL			

UNLESS OTHERWISE NOTED:  
TOLERANCES: DECIMALS  
FRACTIONS  $\pm \frac{1}{16}$  X  $\pm .1$   
ANGLES  $\pm 1^\circ$  .XX  $\pm .03$   
XXX  $\pm .005$   
MACHINED SURFACE FINISHES =  $\frac{125}{25}$   
PROJECTION OF VIEWS   
ALL DIMENSIONS ARE IN INCHES

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MANUFACTURING  
COMPANY  
WACO TEXAS

DWN. BY	DATE
SKV	10/01/10
SIZE	SCALE
A	FULL
EST WT #	MANUAL
—	—
SHEET	DWG. NO.
1 OF 1	35890-SEE ABOVE

BOOT,  
AIR CYLINDER

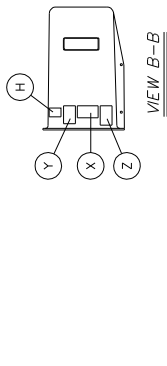
## SECTION 108

### DECAL PLACEMENT (OPTION DE-1330-24)

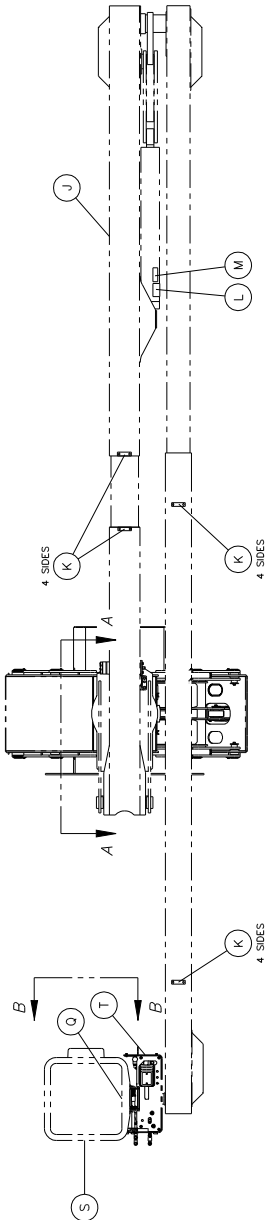
When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.

DECAL PLACEMENT

REV. 0



VIEW B-B



VIEW A-A  
SCALE.....1.5X

QTY.	ITEM	PART NO.	DESCRIPTION
1	Z	4542-12	DECAL, DANGER QUALIFIED OPERATOR
1	Y	4542-5	DECAL, CAUTION OPERATION
1	X	4542-4	DECAL, DANGER ELECTROCUTION
7	W	34005-1	DECAL, PINCH POINT
4	V	4542-2	DECAL, DANGER ELECTROCUTION
1	U	7584-1	DECAL, RELIEF ADJUSTMENT
1	T	30593-1	DECAL, LANYARD ATTACHMENT
1	S	4541-1	DECAL, VERSALIFT
1	R	27648-1	DECAL, PINCH HAZARD
1	Q	14110-1	DECAL, ELECTROCUTION HAZARD
1	P	12337-1	DECAL, OWNERSHIP TRANSFER
1	N	426-011	DECAL, VERSALIFT DIAMOND
4	M	15732-1	DECAL, EMERGENCY LOWERING
4	L	7500-1	DECAL, HOLDING VALVE
16	K	5098-1	DECAL, INSULATED SECTION
2	J	4541-2	DECAL, VERSALIFT
1	H	14014-1	DECAL, PLATFORM INSTRUCTION
2	G	34004-2	DECAL, LOWER CONTROL
1	F	4542-12	DECAL, DANGER QUALIFIED OPERATOR
1	E	4542-5	DECAL, CAUTION OPERATION
1	D	4542-4	DECAL, DANGER ELECTROCUTION
1	C	8928-1	DATA PLATE
1	B	11099-1	DATA PLATE BACKING
2	A	35878-DWG	DECAL PLACEMENT

SEE NOTE 2 \*

SEE NOTE 3 \*

\*

SEE NOTE 4 \*

SEE NOTE 4 \*

SEE NOTE 4 \*

NOTES:

- 1.) \* INDICATES PARTS TO BE SHIPPED LOOSE.
- 2.) ITEM "V" TO BE MOUNTED FRONT, REAR AND EACH SIDE OF CHASSIS.
- 3.) ITEM "U" TO BE MOUNTED NEAR RELIEF VALVE.
- 4.) ITEMS "D", "E" AND "F" ARE TO BE LOCATED ON BODY PANELS NEAR LOWER CONTROL PANEL.

LOWER CONTROL PANEL  
SCALE.....2X

UNLESS OTHERWISE NOTED:  
TOLERANCES: FRACTIONS DECIMALS  
ANGLES: ± 1/16 ± .005 ± .01  
MACHINED SURFACE FINISH: 125  
PROJECTION OF VIEWS: 1/8  
ALL DIMENSIONS ARE IN INCHES  
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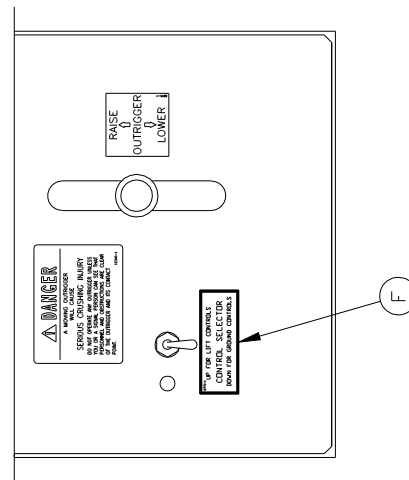
DASH NO.	DESCRIPTION	CODE
-1	DECAL PLACEMENT (ASPLUNDH) V0270E	DE-1330-24

TIME	MANUFACTURING	COMPANY	WACO TEXAS
MATERIAL	EST WT #	MANUAL	1=40
FINISH	SHEET	1	OF 1
DWG. NO.	35878-DWG		

## SECTION 109

# OUTRIGGER CONTROL DECALS (OPTION DE-1400-4)

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.



\*\* = ITEMS TO BE SHIPPED LOOSE

DASH #	DESCRIPTION	OPTION #
- 1	DUAL VALVE & DUAL VALVE WITHOUT MICROSWITCH	DE-1400-1
- 2	SINGLE VALVE & SINGLE VALVE WITHOUT MICROSWITCH	DE-1400-2
- 3	DUAL VALVE & DUAL VALVE W/ MICROSWITCH W/ INTERLOCK	DE-1400-3
- 4	SINGLE VALVE & SINGLE VALVE W/ MICROSWITCH W/ INTERLOCK	DE-1400-4
- 5	DUAL VALVE & DUAL VALVE W/MICROSWITCH, UK SPECIAL	DE-1400-5
- 6	DUAL VALVE & DUAL VALVE W/ROTARY SELECTOR	DE-1400-10
- 7	SINGLE VALVE & SINGLE VALVE W/ROTARY SELECTOR	DE-1400-11

	-7	-6	-5	-4	-3	-2	-1	
*	1	1	-	-	-	-	-	G 8400-4
*	-	-	-	1	1	-	-	F 8773-1
*	2	4	4	2	4	2	4	E 12341-1
*	2	4	-	2	4	2	4	D 8845-1
*	-	-	-	-	-	1	1	C 8400-3
*	2	4	4	2	4	2	4	B 4992-1
	1	1	1	1	1	1	1	A 20088-DWG
	QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	ITEM
								DESCRIPTION
								LIST OF MATERIAL

(NOT SHOWN)

## SECTION 110

### UPPER CONTROL DECAL KIT SINGLE STICK BETWEEN BOOM & BASKET (OPTION DE-1330-18)


When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.

REV.	
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DASH NO.	DESCRIPTION	CODE
-1	DECAL KIT UPPER CNTRL S--STK BTWN BM AND BKT V0255/260REV-02	DE-1330-9
-2	DECAL KIT UPPER CNTRL S--STK BTWN BM AND BKT V0255/260REAR-02	DE-1330-10
-3	DECAL KIT UPPER CNTRL S--STK BTWN BM AND BKT V0265E/270REV	DE-1330-11
-4	DECAL KIT UPPER CNTRL S--STK BTWN BM AND BKT V0265E/270REAR	DE-1330-12
-5	DECAL KIT UPPER CNTRL S--STK BTWN BM AND BKT WITH PLATFORM TILT	DE-1330-13
-6	HR DECAL KIT UPPER CNTRL S--STK BTWN BM AND BKT V0255/260REV-02	DE-1330-16
-7	HR DECAL KIT UPPER CNTRL S--STK BTWN BM AND BKT V0255/260REAR-02	DE-1330-17
-8	HR DECAL KIT UPPER CNTRL S--STK BTWN BM AND BKT V0265E/270REV	DE-1330-18
-9	HR DECAL KIT UPPER CNTRL S--STK BTWN BM AND BKT V0265E/270REAR	DE-1330-19

-9	-8	-7	-6	-5	-4	-3	-2	-1			
1	1	1	1	-	-	-	-	-	R	35537-1	DECAL, TEST POINT
1	1	1	1	1	1	1	1	1	Q	35500-1	DECAL, UPPER CONTROL NOT INSUL.
1	-	1	-	-	-	-	-	-	P	34258-1	HR DECAL, S-STK CNTRL (LH)
-	1	-	1	-	-	-	-	-	N	34259-1	HR DECAL, S-STK CNTRL (RH)
REF	REF	REF	REF	-	REF	REF	REF	REF	M	-	DECAL, EMERGENCY POWER
REF	REF	REF	REF	-	REF	REF	REF	REF	L	-	DECAL, ENGINE
REF	REF	REF	REF	-	REF	REF	REF	REF	K	-	DECAL, THROTTLE
-	-	-	-	1	-	-	-	-	J	15737-1	DECAL, DANGER PLATFORM TILT
1	1	1	1	-	1	1	1	1	H	26855-1	DECAL, TOOL SELECT
1	1	1	1	-	1	1	1	1	G	12340-1	DECAL, CONDUCTIVE HOSES
1	1	1	1	-	1	1	1	1	F	13366-1	DECAL, TOOL PRESSURE
1	1	1	1	-	1	1	1	1	E	8285-1	DECAL, EMERGENCY STOP
1	1	-	-	-	1	1	-	-	D	33877-1	DECAL, ELEVATOR
-	-	-	-	-	1	-	1	-	C	14408-1	DECAL, S-STK CNTRL (LH)
-	-	-	-	-	1	-	1	-	B	14409-1	DECAL, S-STK CNTRL (RH)
1	1	1	1	1	1	1	1	1	A	33988-DWG	DECAL KIT UPNTRLS

QUANTITY	ITEM	PART NO.	DESCRIPTION
LIST OF MATERIAL			
<div>UNLESS OTHERWISE NOTED: ALL DIMENSIONS ARE IN INCHES FRACTIONS ± 1/16" XX ± .005" XXX ± .003"</div>	<div> TIME</div>	MANUFACTURING COMPANY	TITLE
		WACO TEXAS	DATE
			SHEET
<div>MADE TO ORDER - THIS DRAWING IS THE PROPERTY OF TIME MANUFACTURING AND ITS USE WITHOUT PERMISSION OF TIME MANUFACTURING WILL BE DECLARED LOANED AND NOT TO BE REPRODUCED OR COPIED FOR ANY PURPOSES.</div>	MATERIAL	EST WT # MANUAL	SCALE
	SEE LIST OF MATERIAL	-	1=10
	-	X	
	-	1 OF 3	
	-	DWC. NO.	
	-	33988B-DWG	

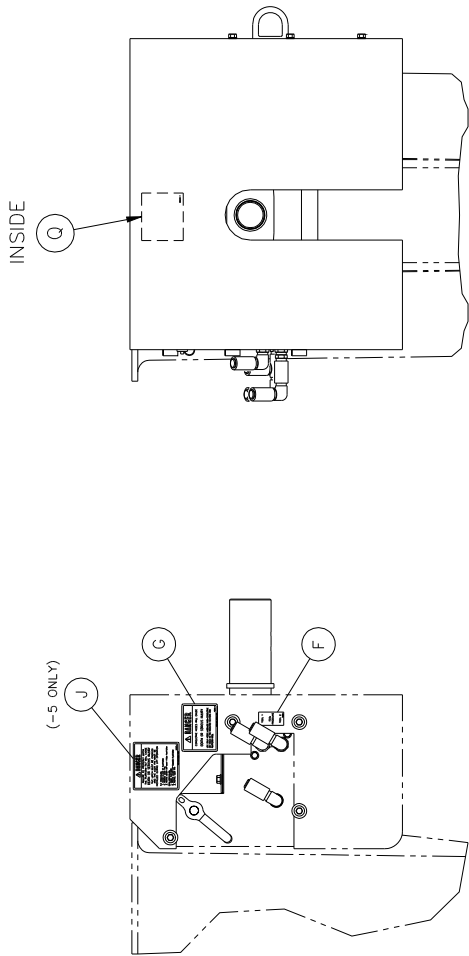
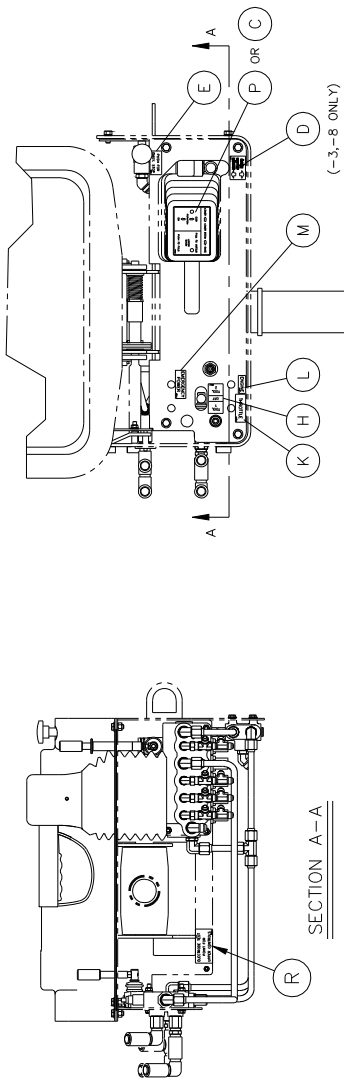
UNLESS OTHERWISE NOTED: DIMENSIONS ARE IN INCHES TOLERANCES ± 1/16 ANGLES ± .005 MACHINED SURFACE FINISHES: 125				MANUFACTURING COMPANY WACO TEXAS		LBR 7-24-08 SHEET 1 OF 10 B 1=10		DETAIL KIT UP CNTRLRS BTWN BM AND BKT WQ255/260-02, WQ265/270E	
ALL DIMENSIONS ARE IN INCHES				MATERIAL		EST WT #		QTY	
INFORMATION ON THIS SHEET IS THE PROPERTY OF TIME MANUFACTURING COMPANY. IT IS TO BE MAINTAINED, CONTROLLED, AND NOT REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF TIME MANUFACTURING COMPANY.				FINISH		SHEET		DWG. NO.	
				---		---		33988-DWG	



PARTS AND ASSEMBLIES

UPPER CONTROL DECAL KIT

REV. 1

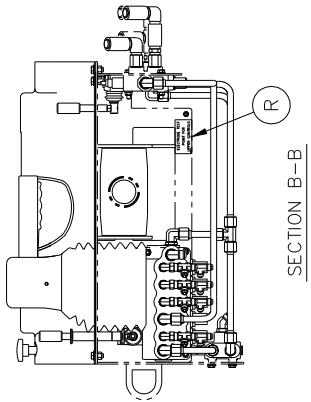
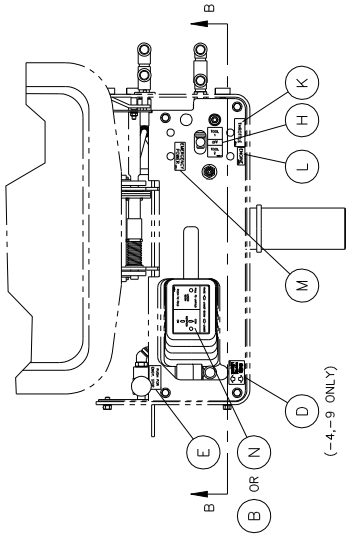


-3,-5 AND -8 CONFIG. SHOWN  
-1 AND -6 CONFIG. SIMILAR

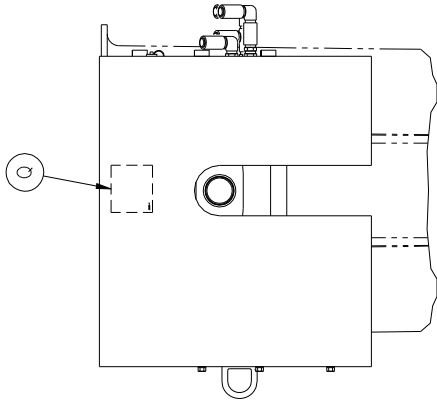
USE UNLESS OTHERWISE NOTED: TOLERANCES: DECIMALS FRACTIONS: 1/16, 1/8, 3/16, 1/2, 3/4, 1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24, 30, 36, 48, 60, 72, 96, 120, 144, 180, 240, 360, 480, 720, 1440, 2880, 5760, 11520, 23040, 46080, 92160, 184320, 368640, 737280, 1474560, 2949120, 5898240, 11796480, 23592960, 47185920, 94371840, 188743680, 377487360, 754974720, 1509949440, 3019898880, 6039797760, 12079595520, 24159191040, 48318382080, 96636764160, 193273528320, 386547056640, 773094113280, 1546188226560, 3092376453120, 6184752906240, 12369505812480, 24739011624960, 49478023249920, 98956046499840, 197912092999680, 395824185999360, 791648371998720, 1583296743997440, 3166593487994880, 6333186975989760, 12666373951979520, 25332747903959040, 50665495807918080, 101330991615836160, 202661983231672320, 405323966463344640, 810647932926689280, 1621295865853378560, 3242591731706757120, 6485183463413514240, 12970366926827028480, 25940733853654056960, 51881467707308113920, 103762935414616227840, 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# UPPER CONTROL DECAL KIT

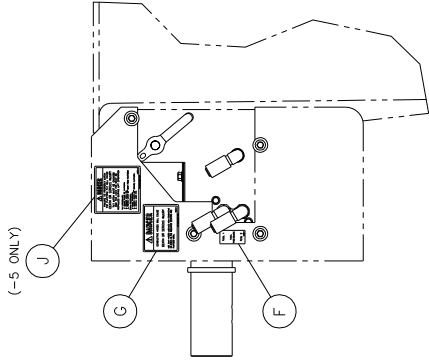
REV. 1



INSIDE



(-5 ONLY)



-4, -5 AND -9 CONFIG. SHOWN  
-2 AND -7 CONFIG. SIMILAR

<p>UNLESS OTHERWISE NOTED: TOLERANCES: FRACTIONS: XX ± 1/16 DECIMALS: .XX ± .03 ANGLES: ± 1°</p> <p>MACHINED SURFACE FINISHES: 125 FINISHES: 125</p> <p>PROJECTION OF VIEWS: 125</p> <p>THIS PRINT CONTAINS CONFIDENTIAL INFORMATION. IT IS THE PROPERTY OF TIME MANUFACTURING AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, WITHOUT EXPRESS PERMISSION OF TIME MANUFACTURING.</p>		<p>MANUFACTURING COMPANY WACO TEXAS</p>	<p>OWN BY DATE LBR 7-24-08</p>	<p>TITLE DECAL KIT UP CNTRL BTWN BM AND BKT W0255/260-02, W0265/270E</p>	DRAWING NO. 33988-DWG	
					DWG. NO.	
					SHEET 3 OF 3	
					FINISH	
SEE SHEET 1						
MATERIAL						
TEST WT # MANUAL X						
SCALE 1=10						
SIZE B						
LBR 7-24-08						
DECAL KIT UP CNTRL						
BTWN BM AND BKT						
W0255/260-02, W0265/270E						



## SECTION 111

### EMERGENCY POWER INSULATED 12VDC (OPTION EP-1340-1)

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.


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INSULATED UNITS COLLECTOR RING USAGE CHART				
WIRE NO.	OPTION COMBINATIONS			
1	SS	SS	THROT	EP
2	THROT	EP		
3	FD			

UNLESS OTHERWISE NOTED:  
TOLERANCES: DECIMALS  
FRACTIONS: 1/16 .XX ± .03  
ANGLES ± .XXX ± .005  
MACHINED SURFACE FINISHES = 125  
PROJECTION OF VIEWS  
ALL DIMENSIONS ARE IN INCHES

S 03 1979		LIST OF MATERIAL				TITLE
		MANUFACTURING COMPANY	DWG. BY	DATE	EMERGENCY PWR INSTALLATION (INSULATED)	
WACO TEXAS		LBR	10-22-79			
		SCALE	B	1=3		
		EST WT #	MANUAL	—		
FINISH		SHEET	1	OF 1	DWG. NO.	34823—DWG

EMERGENCY POWER

REV.

SCHEMATIC

MONARCH SERVICE PARTS			
ITEM	PART DESCRIPTION	PART NO.	QTY.
1	SOLENOID	68034-9	1
2	BASE ASSY.	Y1661	1
3	HYD. PUMP	Y1662	1
4	ELEC. MOTOR	Y1664	1
5	CABLE	Y1663	1
6	TERM. INSUL.	68176-11	2

MANUFACTURING COMPANY  
WACO TEXAS

UNLESS OTHERWISE NOTED:  
DIMENSIONS ARE IN INCHES  
FRACTIONS ARE 1/16, 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1 1/4, 1 1/2, 1 3/4, 2, 2 1/4, 2 1/2, 3, 3 1/4, 3 1/2, 4, 4 1/4, 4 1/2, 5, 5 1/4, 5 1/2, 6, 6 1/4, 6 1/2, 7, 7 1/4, 7 1/2, 8, 8 1/4, 8 1/2, 9, 9 1/4, 9 1/2, 10, 10 1/4, 10 1/2, 11, 11 1/4, 11 1/2, 12, 12 1/4, 12 1/2, 13, 13 1/4, 13 1/2, 14, 14 1/4, 14 1/2, 15, 15 1/4, 15 1/2, 16, 16 1/4, 16 1/2, 17, 17 1/4, 17 1/2, 18, 18 1/4, 18 1/2, 19, 19 1/4, 19 1/2, 20, 20 1/4, 20 1/2, 21, 21 1/4, 21 1/2, 22, 22 1/4, 22 1/2, 23, 23 1/4, 23 1/2, 24, 24 1/4, 24 1/2, 25, 25 1/4, 25 1/2, 26, 26 1/4, 26 1/2, 27, 27 1/4, 27 1/2, 28, 28 1/4, 28 1/2, 29, 29 1/4, 29 1/2, 30, 30 1/4, 30 1/2, 31, 31 1/4, 31 1/2, 32, 32 1/4, 32 1/2, 33, 33 1/4, 33 1/2, 34, 34 1/4, 34 1/2, 35, 35 1/4, 35 1/2, 36, 36 1/4, 36 1/2, 37, 37 1/4, 37 1/2, 38, 38 1/4, 38 1/2, 39, 39 1/4, 39 1/2, 40, 40 1/4, 40 1/2, 41, 41 1/4, 41 1/2, 42, 42 1/4, 42 1/2, 43, 43 1/4, 43 1/2, 44, 44 1/4, 44 1/2, 45, 45 1/4, 45 1/2, 46, 46 1/4, 46 1/2, 47, 47 1/4, 47 1/2, 48, 48 1/4, 48 1/2, 49, 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## SECTION 112

# PREP KIT AIR OPERATED PLATFORM CONTROLS (OPTION CC-1330-5)

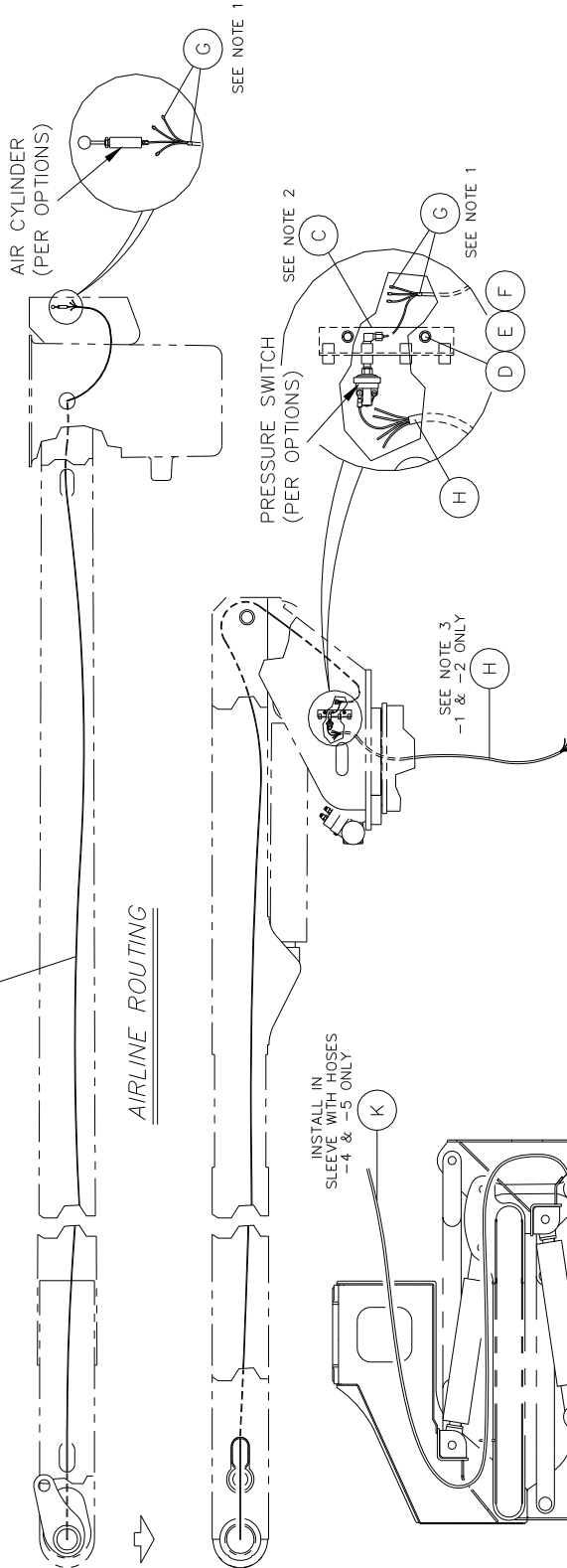
When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.

EXTRA CONTROL CIRCUIT

REV



ROUTE IN SLEEVES  
WITH HOSES



	-5	-4	-3	-2	-1
25 FT. 25 FT.	-	-	-	-	-

61025-1	K	61025-1	CABLE 14 GA - 5 CONDUCTOR
21876-1	J	21876-1	PEDESTAL SWITCH PLATE ASSY
61025-1	H	61025-1	CABLE 14 GA - 5 CONDUCTOR
15348-1	G	15348-1	SILICONE SEALANT
42005-1	F	42005-1	1/4-NC LOCKNUT
44013-7	E	44013-7	1/4 HARDENED WASHER
40002-7	D	40002-7	1/4-NC X 1 1/2 LG HHCS
6556-3	C	6556-3	PRESSURE SWITCH BRACKET
58036-1	B	58036-1	4 IN 1 AIRLINE BUNDLE
20578-DWG	A	20578-DWG	PREP KIT - AIR OPER PLTRM CNTRLS

SEE NOTE 3

\*

DASH NO.	DESCRIPTION	CODE
-1	PREP KIT - AIR OPER PLTRM CNTROLS V0255-02	CC-1330-1
-2	PREP KIT - AIR OPER PLTRM CNTROLS V0260-02	CC-1330-2
-3	PREP KIT - RADIO PLTRM CNTROLS	CC-1330-3
-4	PREP KIT - AIR OPER PLTRM CNTROLS V0265E	CC-1330-4
-5	PREP KIT - AIR OPER PLTRM CNTROLS V0270E	CC-1330-5

NOTE:

- 1.) APPLY SILICONE SEALANT TO ALL UNUSED AIRLINES AND TO END OF AIRLINE JACKET AS SHOWN.
- 2.) MOUNT ITEM "C" ON SAME SIDE OF TURRET AS LOWER CONTROL VALVE.
- 3.) CUT ITEM "H" AS REQ'D TO WIRE PRESSURE SWITCHES, COLLECTOR RINGS AND LOWER CONTROL SWITCHES.
- 4.) \* INDICATES PART IS TO SHIP LOOSE.

UNLESS OTHERWISE NOTED:  
DIMENSIONS ARE IN INCHES  
FRACTIONS ± 1/16  
DECIMALS ± .03  
ANGLES ± .005  
MACHINED SURFACE FINISHES = .005  
PROJECTION OF VIEWS = 1/2  
ALL DIMENSIONS ARE IN INCHES  
THIS PRINT CONTAINS CONFIDENTIAL INFORMATION AND IS NOT TO BE DISCLOSED, COPIED, OR REPRODUCED WITHOUT EXPRESSED PERMISSION OF TIME MANUFACTURING.



MANUFACTURING  
COMPANY  
WACO TEXAS

DOWN BY DATE  
LBR 6-4-08  
SIZE SCALE  
A 1=38  
LOCATION MANUAL  
SHEET 1 OF 1

PREP KIT  
FOR PLATFORM  
CONTROLS

DWG. NO.  
20578-DWG



## SECTION 113

### **BOOM HOSE KIT (OPTION HK-1330-17)**

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.

BOOM HOSE KIT

PARTS AND ASSEMBLIES

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-3

-2

-1

2	-	-	AD	6580-100	5/16 I.D. NC HOSE ASSY X (519 LG.)
2	-	-	AC	10286-26	1/4 I.D. NC HOSE ASSY X (249 LG.)
1	1	1	AB	89088-8	HOSE SLEEVE 1.25 X 48 LG
2	2	2	AA	89088-12	HOSE SLEEVE 1.25 X 25 LG
1	1	1	Z	89088-6	HOSE SLEEVE 1.25 X 100 LG
1	1	1	Y	89164-7	HOSE SLEEVE 2.96 X 84 LG
1	1	1	X	89164-6	HOSE SLEEVE 2.96 X 75 LG
1	1	1	W	89128-11	HOSE SLEEVE 3.66 X 96 LG
2	2	2	V	10286-25	1/4 I.D. NC HOSE ASSY X (27 LG.)
2	2	2	U	50077-3	# JIC UNION TEE
-	2	-	T	6580-98	5/16 I.D. NC HOSE ASSY X (546 LG.)
2	2	-	S	55679-4	5/16 I.D. NC HOSE ASSY X (765 LG.)
4	4	-	R	3864-183	3/8 I.D. NC HOSE ASSY X (768 LG.)
2	2	-	Q	4532-107	1/2 I.D. NC HOSE ASSY X (771 LG.)
1	1	-	P	4532-119	1/2 I.D. NC HOSE ASSY X (773 LG.)
-	-	2	N	6580-97	5/16 I.D. NC HOSE ASSY X (492 LG.)
-	-	2	M	55679-3	5/16 I.D. NC HOSE ASSY X (705 LG.)
-	-	4	L	3864-182	3/8 I.D. NC HOSE ASSY X (714 LG.)
-	-	2	K	4532-108	1/2 I.D. NC HOSE ASSY X (717 LG.)
-	-	1	J	4532-118	1/2 I.D. NC HOSE ASSY X (719 LG.)
2	2	2	H	50054-3	3/8 JIC BULKHEAD UNION
2	2	2	G	50075-3	3/8 S.N. BRANCH TEE
2	2	2	F	50056-3	3/8 BULKHEAD NUT
-	2	2	E	10286-24	1/4 I.D. NC HOSE ASSY X (222 LG.)
2	2	2	D	3864-18	3/8 I.D. NC HOSE ASSY X (27 LG.)
2	2	2	C	3864-177	3/8 I.D. NC HOSE ASSY X (64 LG.)
2	2	2	B	10286-7	1/4 I.D. NC HOSE ASSY X (32 1/2 LG.)
1	1	1	A	33879-DWG	BOOM HOSE KIT


UNLESS OTHERWISE NOTED:  
TOLERANCES:  
FRACTIONS ± 1/16  
DECIMALS  
X ± .1  
.XX ± .03  
.XXX ± .005  
ANGLES ±

MACHINED SURFACE FINISHES = 125

PROJECTION OF VIEWS

ALL DIMENSIONS ARE IN INCHES

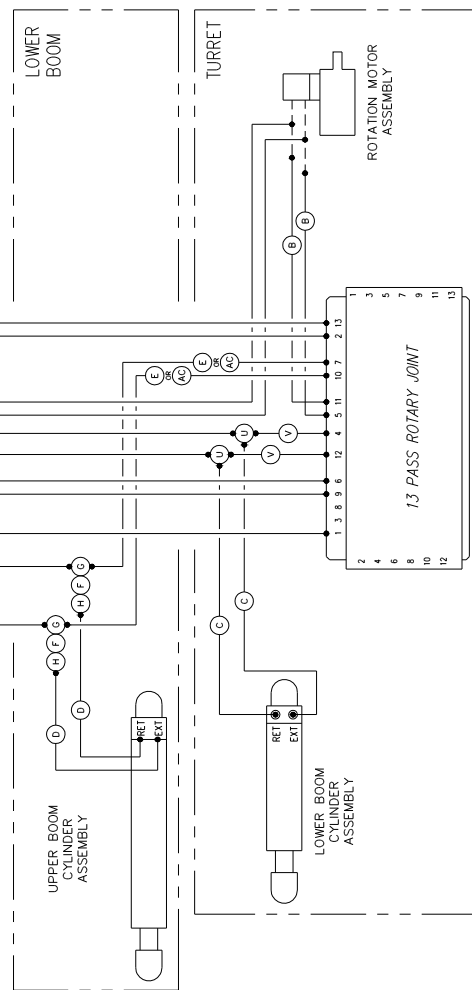
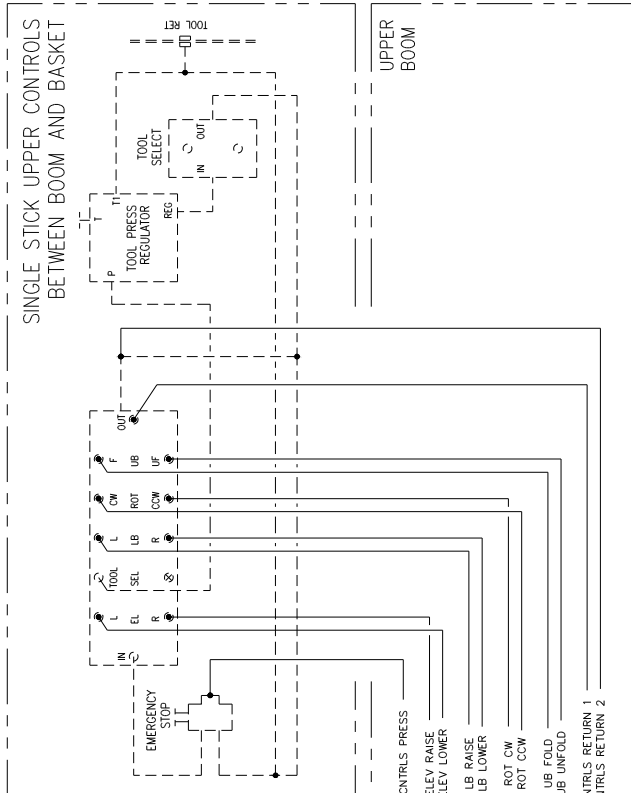
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PERMISSION OF TIME MANUFACTURING.

UNLESS OTHERWISE NOTED: DIMENSIONS IN DECIMALS FRACTIONS ANGLES ± 1/16 XX ± .004 XXX ± .003 PROJECTION OF NEW MATERIAL		 MANUFACTURING COMPANY WACO TEXAS		DWN BY DATE LBR 7-28-08 SCALE SIZE B 1=12 TEST WT # MATERIAL ————	TITLE BOOM HOSE KIT V0265E/270E
THIS PRINT CONTAINS CONFIDENTIAL INFORMATION AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, WITHOUT EXPRESS PERMISSION OF TIME MANUFACTURING.		FINISH — — — —		SHEET 1 OF 2	DWG. NO. 33879-DWG

# BOOM HOSE KIT

REV. 1

HOSE SLEEVE USAGE CHART	
ITEM NO.	USED AT
W	HOSES THRU LEVELING SHAFT AT BOOM KNUCKLE
X	HOSES THRU PLATFORM SHAFT AT BOOM TIP
Y	HOSES AROUND BOOM PIVOT AT TURRET (ALL BUT CW/CCW)
Z	HOSES AROUND BOOM PIVOT AT TURRET (CW/CCW ONLY)
AA	HOSES AT UPPER BOOM CYLINDER
AB	HOSES AT LOWER BOOM CYLINDER



PORT	FUNCTION
1	PRESSURE TO UPPER CONTROLS
2	RETURN FROM UPPER CONTROLS
3	—
4	LWR BM RAISE
5	ROT CCW
6	ELEVATOR LOWER
7	UPPER BM FOLD
8	—
9	ELEVATOR RAISE
10	UPPER BM UNFOLD
11	ROT CW
12	LWR BM LOWER
13	RETURN FROM UPPER CONTROLS

UNLESS OTHERWISE NOTED, DIMENSIONS ARE IN INCHES.  
FRACTIONS: 1/16 XX 1/32  
DECIMALS: .005 .010 .015 .020 .030 .040 .050 .060 .070 .080 .090 .100  
MATERIAL: 304 STAINLESS STEEL  
FINISH: POLISHED  
TOLERANCES: .005 INCHES  
ALL DIMENSIONS ARE IN INCHES  
INFORMATION AND IS SOLE PROPERTY OF TIME MANUFACTURING  
TO BE REPRODUCED, COPIED, OR  
PERMISSION OF TIME MANUFACTURING.

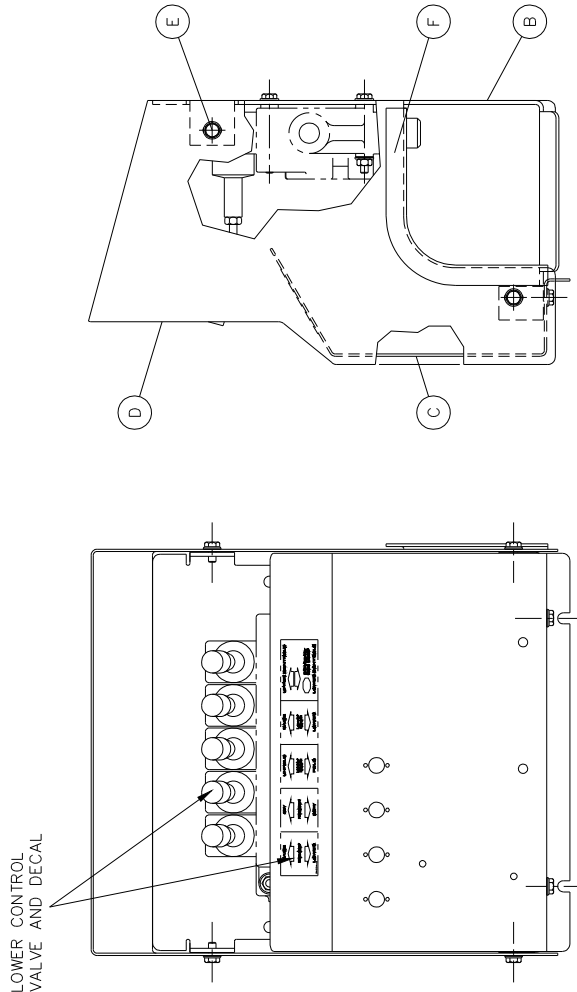
TIME  
MANUFACTURING COMPANY  
WACO, TEXAS  
BOOM HOSE KIT  
V0265E/270E  
SCALE: 1"=12'  
SHEET: 2 OF 2  
DWG. NO.: 33879-DWG

## SECTION 114

### LOWER CONTROL PANEL (OPTION HYD-1330-11)

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.

LOWER CONTROLS

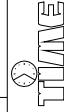


NOTES:  
1.) INSTALLER TO DETERMINE MOUNTING LOCATION,  
PROVIDE MOUNTING HARDWARE, AND MAKE ANY  
PROVISIONS NECESSARY TO MOUNT THIS OPTION.  
2.) \* INDICATES THAT PART IS SHIPPED LOOSE.

DASH NO.	DESCRIPTION	CODE
-1	LOWER CONTROL PANEL (ASPLUNDH)	HYD-1330-11

-1		QTY.	ITEM	PART NO.	DESCRIPTION
*	75 FT.	F	89003-1	VINYL TRIM (9" LG.)	
*	6	E	40047-5	1/4NC X 3/8 LG. HWHTS	
*	1	D	28104-1	CONTROL COVER	
*	1	C	28102-1	CONTROL PANEL	
*	1	B	28100-1	VALVE MOUNT PLATE	
*	1	A	35877-DWG	LOWER CONTROL PANEL ASSY	
		ITEM	PART NO.	DESCRIPTION	

UNLESS OTHERWISE NOTED,  
DIMENSIONS ARE IN INCHES  
FRACTIONS  $\frac{1}{16}$   $\frac{1}{8}$   $\frac{1}{4}$   $\frac{3}{8}$   $\frac{1}{2}$   $\frac{5}{8}$   $1$   
DECIMALS .0625 .125 .25 .375 .5 .625 .75  
ANGLES  $\pm 1/16$   $\pm 1/8$   $\pm 1/4$   $\pm 1/2$   
HOLE LOCATIONS ARE SHOWN  
FROM FACE UNLESS NOTED  
ALL DIMENSIONS ARE IN INCHES  
DIMENSIONS IN PARENTHESES  
ARE FOR INFORMATION ONLY  
AND ARE NOT TO BE USED FOR  
MANUFACTURING  
REVISIONS OF THIS MANUFACTURING



MANUFACTURING  
COMPANY  
WACO TEXAS

LOWER  
CONTROL PANEL  
ASSEMBLY

35877-DWG

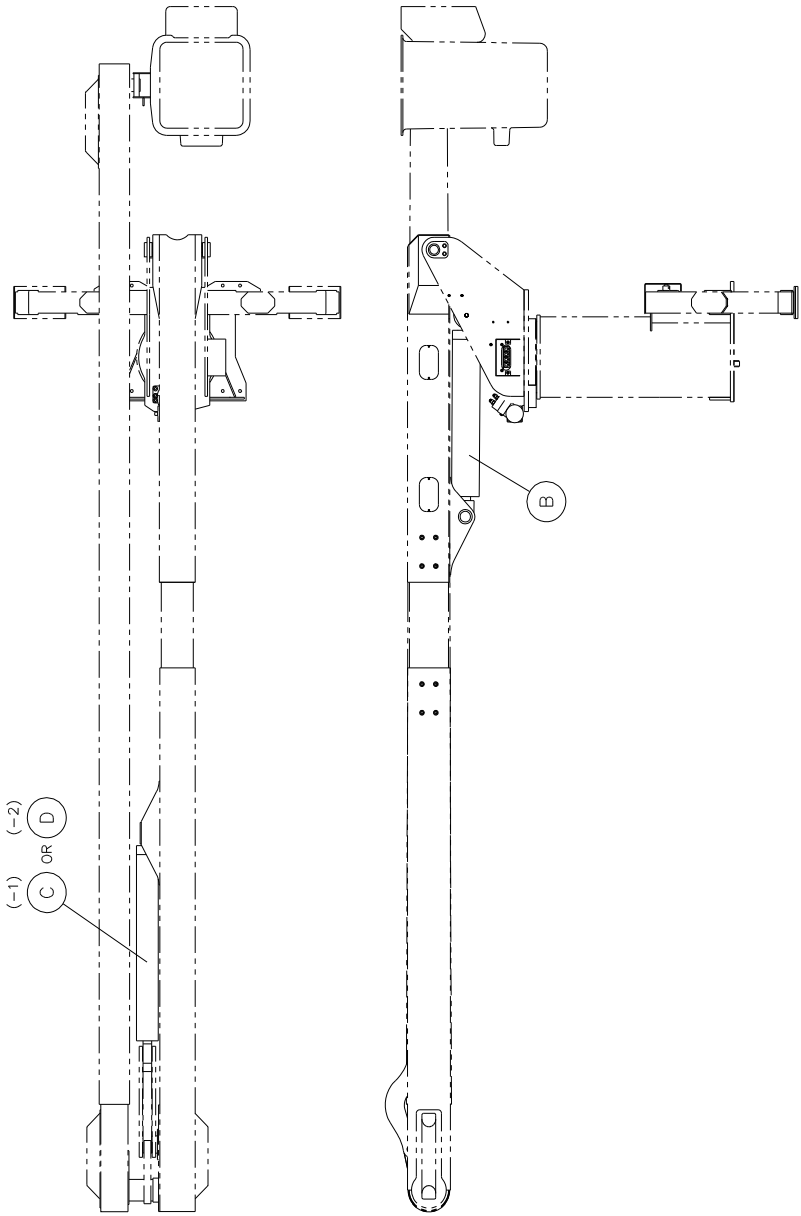
## SECTION 115

### CYLINDERS ASSEMBLY (OPTION HYD-1330-5)

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.

CYLINDERS ASSEMBLY

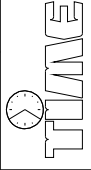
REV. 



DASH NO.	DESCRIPTION	CODE
-1	CYLINDERS V0255-02	HYD-1330-4
-2	CYLINDERS V0260-02	HYD-1330-5

-2 -1

1	-	D	22211-2	UPPER CYLINDER ASSEMBLY
-	1	C	22211-1	UPPER CYLINDER ASSEMBLY
1	1	B	22210-1	LOWER CYLINDER ASSY
1	1	A	20574-DWG	CYLINDER ASSEMBLY
QTY.	QTY.	ITEM	PART NO.	DESCRIPTION



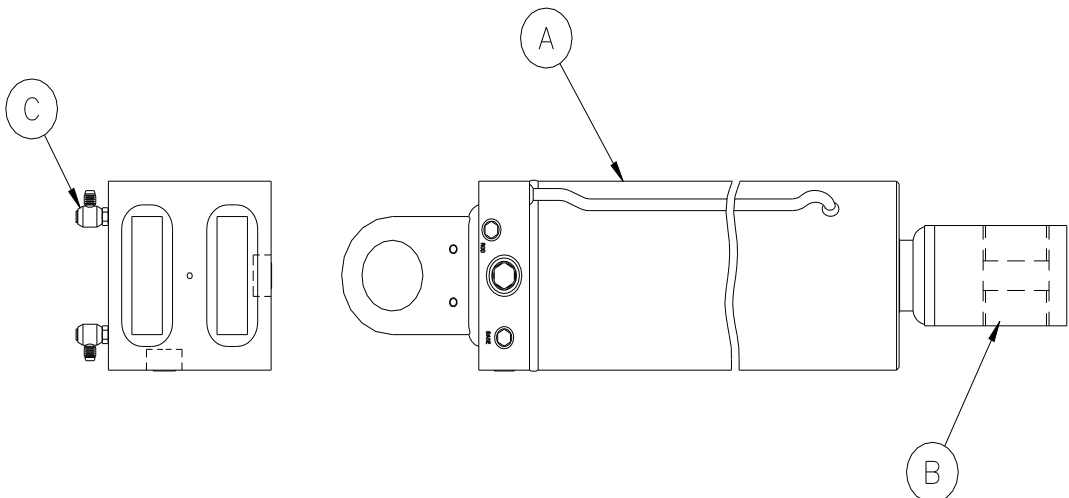
MANUFACTURING  
COMPANY  
WACO TEXAS

UNLESS OTHERWISE NOTED:  
TOLERANCES: DECIMALS  
FRACTIONS 1/16  
ANGLES ± .03  
± .XX ± .005  
± .XXX ± .005  
MACHINED SURFACE FINISHES= 125  
PROJECTION OF VIEWS  
ALL DIMENSIONS ARE IN INCHES  
THIS PRINT CONTAINS CONFIDENTIAL  
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LIST OF MATERIAL				TITLE
DWN. BY	DATE	LBR	6-4-08	CYLINDER ASSEMBLY
SIZE	SCALE	A	1=50	
EST WT #	MANUAL			
MATERIAL				
FINISH				
SHEET				
1 OF 1				DWG. NO. 20574-DWG



REV.  
6



INSTALL FLUSH TO OUTER  
EDGE OF ROD END, TYP.

CYLINDERS

PARTS AND ASSEMBLIES

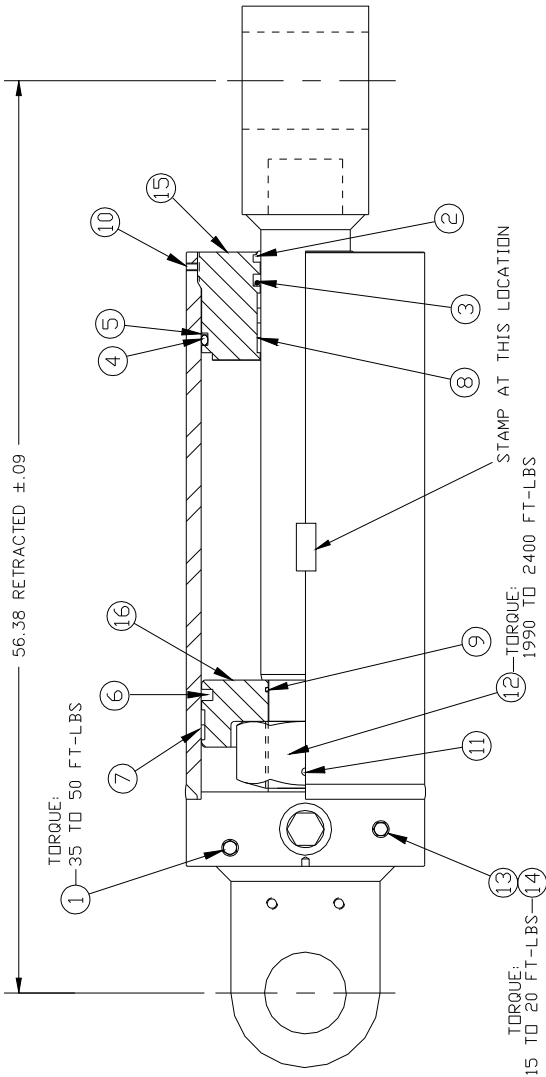
-1			
2	C	50107-1	#6 SAE O-RING SWIVEL JOINT FITTING
2	B	22163-1	BEARING
1	A	22105-1	LOWER CYLINDER ASSEMBLY
QTY.	ITEM	PART NO.	DESCRIPTION

LIST OF MATERIAL

UNLESS OTHERWISE NOTED: TOLERANCES: FRACTIONS ± 1/16 DECIMALS X ± .1 XX ± .03 ANGLES ± 1° XXX ± .005  MACHINED SURFACE FINISHES= 125/ PROJECTION OF VIEWS  ALL DIMENSIONS ARE IN INCHES  THIS PRINT CONTAINS CONFIDENTIAL INFORMATION AND IS SOLE PROPERTY OF TIME MANUFACTURING, AND IS NOT TO BE DISCLOSED, COPIED, OR REPRODUCED WITHOUT EXPRESSED PERMISSION OF TIME MANUFACTURING.	  MANUFACTURING COMPANY  WACO TEXAS	DWN. BY	DATE	TITLE	
		CKR	06/20/97	LOWER CYLINDER ASSY W/BRG'S	
		SIZE A	SCALE 1/8	VO-250/255/260	
		LOCATION V	MANUAL -		
		MATERIAL SEE MATERIAL LIST		SHEET 1 OF 1	DWG. NO. 22210-1
		FINISH -----			


CYLINDERS

LOWER BOOM CYLINDER SERVICE PARTS

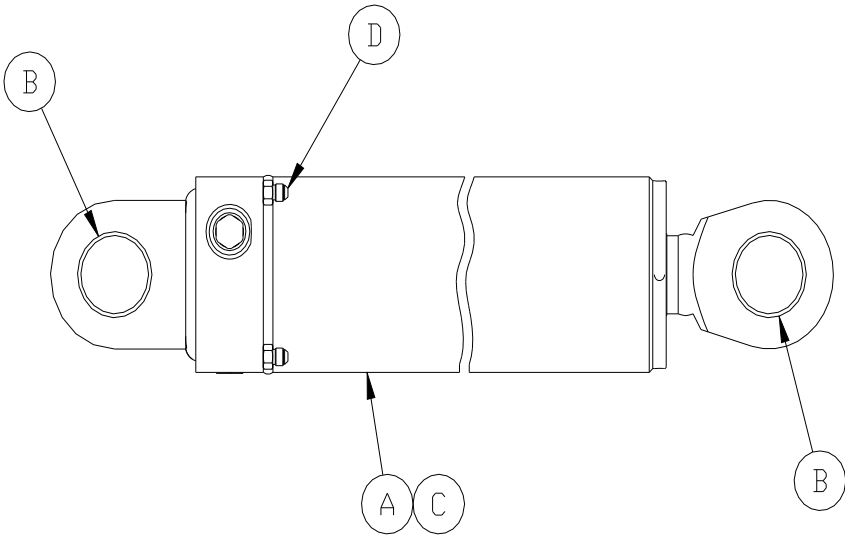


TMS HYD SERVICE PARTS			
ITEM	PART DESCRIPTION	PART NO.	QTY
1	CARTRIDGE VALVE	54050-1	2
2	WIPER	NSS	1
3	U-CUP (DUAL LIP)	NSS	1
4	O-RING	NSS	1
5	BACK-UP	NSS	1
6	AD SEAL	NSS	1
7	WEAR RING	NSS	2
8	WEAR RING	NSS	4
9	O-RING	NSS	1
10	SET SCREW	Y3028	1
11	ROLL PIN	Y3027	1
12	LOCK NUT	Y3029	1
13	BLEEDER VALVE	Y3023	2
14	WASHER	Y3030	1
15	HEAD	Y3030	1
16	PISTON	Y3031	1
-	SEAL KIT	Y3022	1

\* SEAL KIT CONTAINS ITEMS 2 - 9.  
\*NSS (Not Sold Separately)

		MANUFACTURING COMPANY		DATE		TITLE	
UNLESS OTHERWISE NOTED:		TOLERANCES:		MATERIAL		DWG. NO.	
DECIMALS	± .005	1/16	± .005	SEE ABOVE	SHEET		22105-1
FRACTIONS	1/16	1/32	± .005	ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. INFORMATION AND IS SOLE PROPERTY OF TIME MANUFACTURING. IT IS NOT TO BE DISCLOSED, COPIED OR REPRODUCED WITHOUT THE EXPRESS PERMISSION OF TIME MANUFACTURING.	3 OF 3		
ANGLES	± 1/16	1/32	± .005		3 OF 3		
PRODUCTION OF VEE IN CHAMFERS:		PROJECTION OF VEE IN CHAMFERS:		LOCATION		CYLINDER ASSEMBLY	
ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.		ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.		MANUAL		LOWER BOOM	
INFORMATION AND IS SOLE PROPERTY OF TIME MANUFACTURING. IT IS NOT TO BE DISCLOSED, COPIED OR REPRODUCED WITHOUT THE EXPRESS PERMISSION OF TIME MANUFACTURING.		INFORMATION AND IS SOLE PROPERTY OF TIME MANUFACTURING. IT IS NOT TO BE DISCLOSED, COPIED OR REPRODUCED WITHOUT THE EXPRESS PERMISSION OF TIME MANUFACTURING.		V		B 1/4	
PERMISSION OF TIME MANUFACTURING.		PERMISSION OF TIME MANUFACTURING.		V		B 1/4	

REV.  
6



CYLINDERS

CYLINDERS

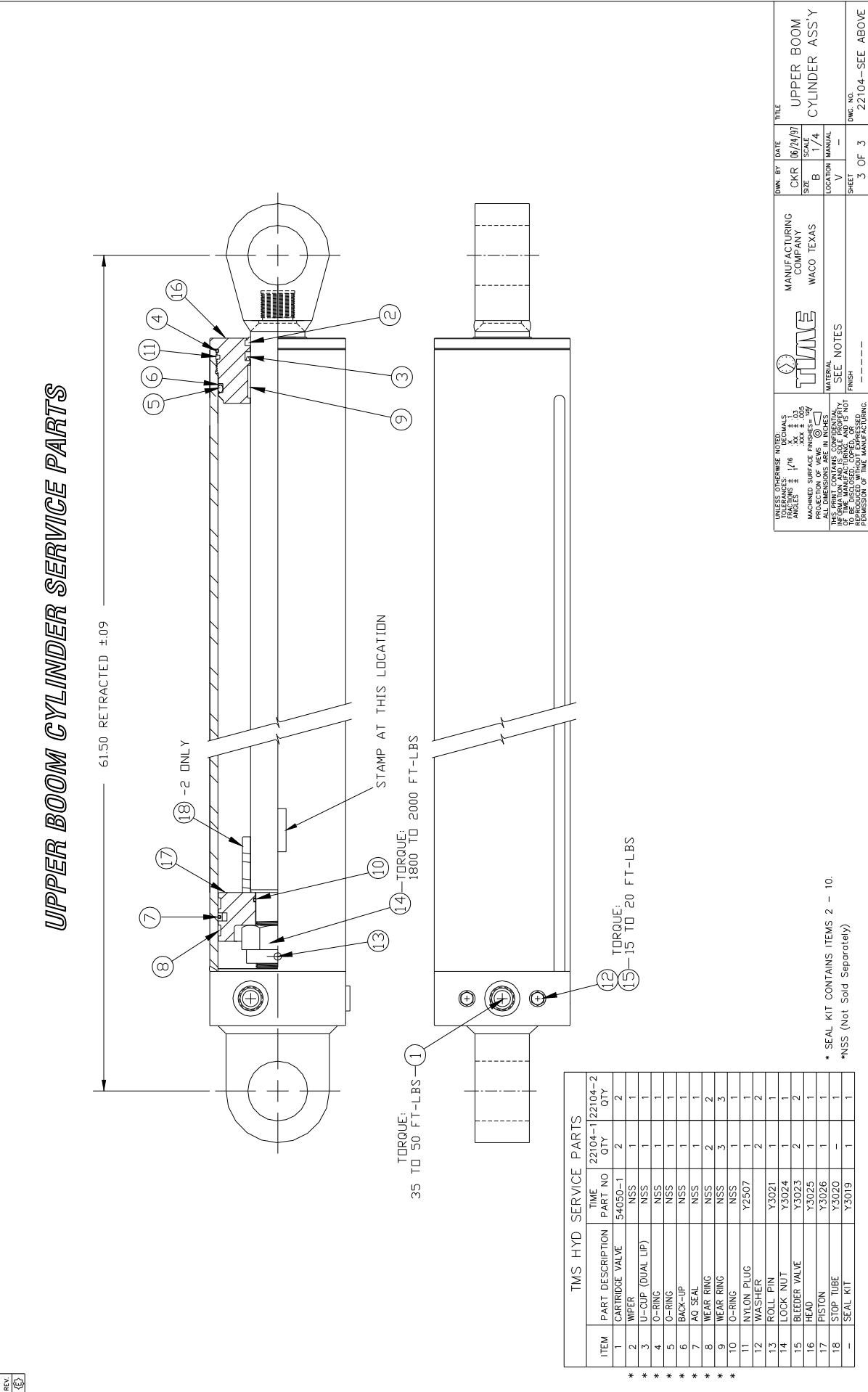
PARTS AND ASSEMBLIES

VO-260		VO-250/255		
-2	-1			
2	2	D	50009-3	#6 O-RING TO 3/8 JIC ADAPTER
1	-	C	22104-2	UPPER CYL ASS'Y (VO-260)
2	2	B	8526-10	BEARING
-	1	A	22104-1	UPPER CYL ASS'Y (VO-250/255)
QTY.	QTY.	ITEM	PART NO.	DESCRIPTION
LIST OF MATERIAL				

UNLESS OTHERWISE NOTED: TOLERANCES: DECIMALS FRACTIONS ± 1/16 X ± .1 ANGLES ± 1° XX ± .03 XXX ± .005  MACHINED SURFACE FINISHES= 125/ PROJECTION OF VIEWS ALL DIMENSIONS ARE IN INCHES  THIS PRINT CONTAINS CONFIDENTIAL INFORMATION AND IS SOLE PROPERTY OF TIME MANUFACTURING, AND IS NOT TO BE DISCLOSED, COPIED, OR REPRODUCED WITHOUT EXPRESSED PERMISSION OF TIME MANUFACTURING.	 MANUFACTURING COMPANY WACO TEXAS	DWN. BY	DATE	TITLE
		CKR	06/20/97	UPPER CYLINDER ASS'Y W/BRG'S
	MATERIAL	SIZE	SCALE	VO-250/255/260
	SEE MATERIAL LIST	A	1/6	
	FINISH -----	LOCATION V	MANUAL -	



CYLINDERS



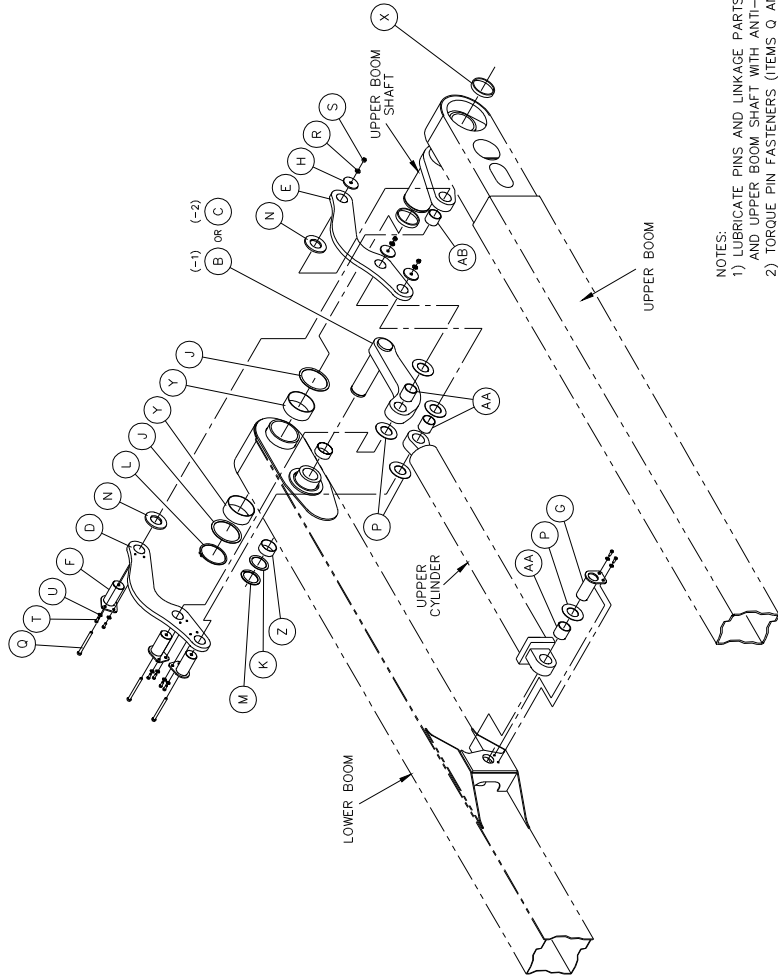
CYLINDERS



# SECTION 116 **KNUCKLE LINKAGE ASSEMBLY - REVERSE (OPTION KN-1330-1)**

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.

# KNUCKLE



NOTES:  
1) LUBRICATE PINS AND LINKAGE PARTS (ITEMS B, C, F, AND G)  
AND UPPER BOOM SHAFT WITH ANTI-SEIZE (ITEM V).  
2) TORQUE PIN FASTENERS (ITEMS Q AND T) PER TMC-778 AND  
APPLY TORQUE SEAL (ITEM W).

REVERSE MOUNT SHOWN

REF	REF	AB	8526-6	BRG 2 3/4 OD X 2 1/2 ID X 2" LG
REF	REF	AA	8526-10	BRG 2 3/4 OD X 2 1/2 ID X 2 1/2" LG
REF	REF	Z	22162-1	BRG 3 1/2 OD X 3 1/4 ID X 1 1/2" LG
REF	REF	Y	22208-1	BRG 6 OD X 5 3/4 ID X 2 1/2" LG
REF	REF	X	22209-1	BRG 5 OD X 4 1/2 ID X 3/4 LG
A/R	A/R	W	84006-2	TORQUE SEAL
A/R	A/R	V	05-030	ANTI-SEIZE
8	8	U	44013-6	3/8 HARDENED WASHER
8	8	T	40004-5	3/8-NC X 1 HHCS
3	3	S	42005-5	1/2 PLATED LOCK NUT
3	3	R	44013-3	1/2 HARDENED WASHER
3	3	Q	40006-21	1/2-NC X 6 LG HHCS
5	5	P	10226-14	PIVOT SPACER, 4 3/4 OD X 2 1/2 ID X .094 THK
2	2	N	10226-15	PIVOT SPACER, 4 3/4 OD X 2 1/2 ID X .34 THK
1	1	M	48048-325	RETAINING RING 3.054 FREE DIA.
1	1	L	48014-87	RETAINING RING 5.396 FREE DIA.
1	1	K	22135-2	WASHER,SPECIAL 4 1/4 OD X 3 1/4 ID
2	2	J	22135-1	WASHER,SPECIAL 6 3/4 OD X 5 3/4 ID
3	3	H	5531-1	PIN CAP
1	1	G	8546-12	PIN ASSY 2 1/2 OD X 5 1/2 LG
3	3	F	22146-1	PIN ASSY 2 1/2 DIA X 4 7/8 LG
1	1	E	22107-2	UPPER LINK WITHOUT TAPPED HOLES
1	1	D	22107-1	UPPER LINK WITH TAPPED HOLES
1	-	C	22207-2	LOWER LINK ASSY W/BRGS (REAR MT)
-	1	B	22207-1	LOWER LINK ASSY W/BRGS (REV MT)
1	1	A	20576-DWG	KNUCKLE LINKAGE ASSY
QTY.	QTY.	ITEM	PART NO.	DESCRIPTION

DASH NO.	DESCRIPTION	CODE
-1	KNUCKLE LINKAGE ASSY - REVERSE	KN-1330-1
-2	KNUCKLE LINKAGE ASSY - REAR	KN-1330-2

UNLESS OTHERWISE NOTED:  
TOLERANCES: DECIMALS  
ANGLES: ± 1/16  
MACHINED SURFACE FINISHES: .001  
PROJECTION OF VIEWS  
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MANUFACTURING  
COMPANY  
WACO TEXAS

LBR 6-4-08  
SCALE  
B 1=30  
EST WT # MANUAL

KNUCKLE  
LINKAGE  
ASSEMBLY

DWG. NO. 20576-DWG

SHEET 1 OF 1

FINISH

SEE LIST OF MATERIAL

TIME

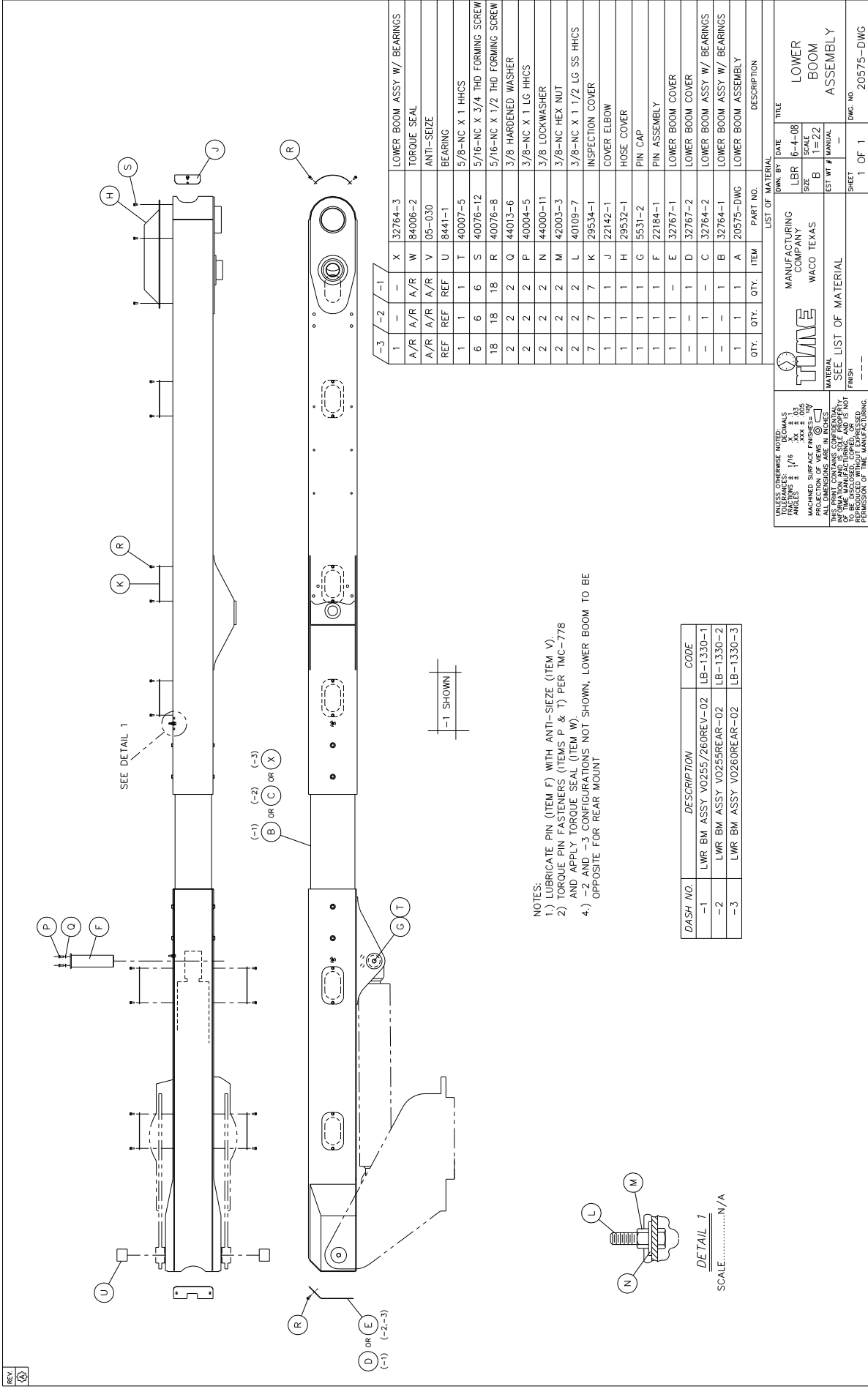


## SECTION 117

### LOWER BOOM ASSEMBLY (OPTION LB-1330-1)

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.

LOWER BOOM



-3 -2 -1			ITEM			DESCRIPTION		
1	-	-	X	32764-3	LOWER BOOM ASSY W/ BEARINGS			
A/R	A/R	A/R	W	84006-2	TORQUE SEAL			
A/R	A/R	A/R	V	05-030	ANTI-SEIZE			
REF	REF	U	8441-1	BEARING				
1	1	1	T	40007-5	5/8-NC X 1 HHCS			
6	6	6	S	40076-12	5/16-NC X 3/4 THD FORMING SCREW			
18	18	18	R	40076-8	5/16-NC X 1/2 THD FORMING SCREW			
2	2	2	Q	44013-6	3/8 HARDENED WASHER			
2	2	2	P	40004-5	3/8-NC X 1 LG HHCS			
2	2	2	N	44000-11	3/8 LOCKWASHER			
2	2	2	M	42003-3	3/8-NC HEX NUT			
2	2	2	L	40109-7	3/8-NC X 1 1/2 LG SS HHCS			
7	7	7	K	29534-1	INSPECTION COVER			
1	1	1	J	22142-1	COVER ELBOW			
1	1	1	H	29532-1	HOSE COVER			
1	1	1	G	5531-2	PIN CAP			
1	1	1	F	22184-1	PIN ASSEMBLY			
1	1	1	E	32767-1	LOWER BOOM COVER			
-	-	-	D	32767-2	LOWER BOOM COVER			
-	-	-	C	32764-2	LOWER BOOM ASSY W/ BEARINGS			
-	-	-	B	32764-1	LOWER BOOM ASSY W/ BEARINGS			
-	-	-	A	20575-DWG	LOWER BOOM ASSEMBLY			
QTY:	QTY:	QTY:	QTY:	QTY:	QTY:	QTY:	QTY:	QTY:

LIST OF MATERIAL			TITLE		
MANUFACTURING COMPANY			LOWER BOOM ASSEMBLY		
WACO TEXAS			20575-DWG		
SEE LIST OF MATERIAL			1 OF 1		
FINISH			20575-DWG		
MATERIAL			1 OF 1		
FINISH			20575-DWG		
MATERIAL			1 OF 1		
FINISH			20575-DWG		
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MATERIAL			1 OF 1		
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MATERIAL			1 OF 1		
FINISH			20575-DWG		

## SECTION 118

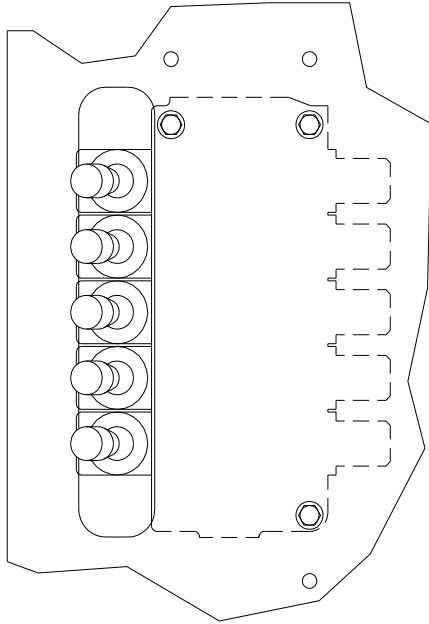
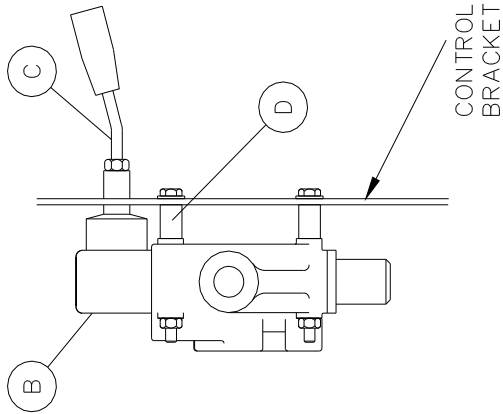
### VALVE KIT LOWER CONTROLS (OPTION HYD-1330-6)

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.

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REV	

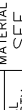


DASH NO.	DESCRIPTION	CODE
-1	VALVE KIT LOWER CONTROLS	HYD-1330-6

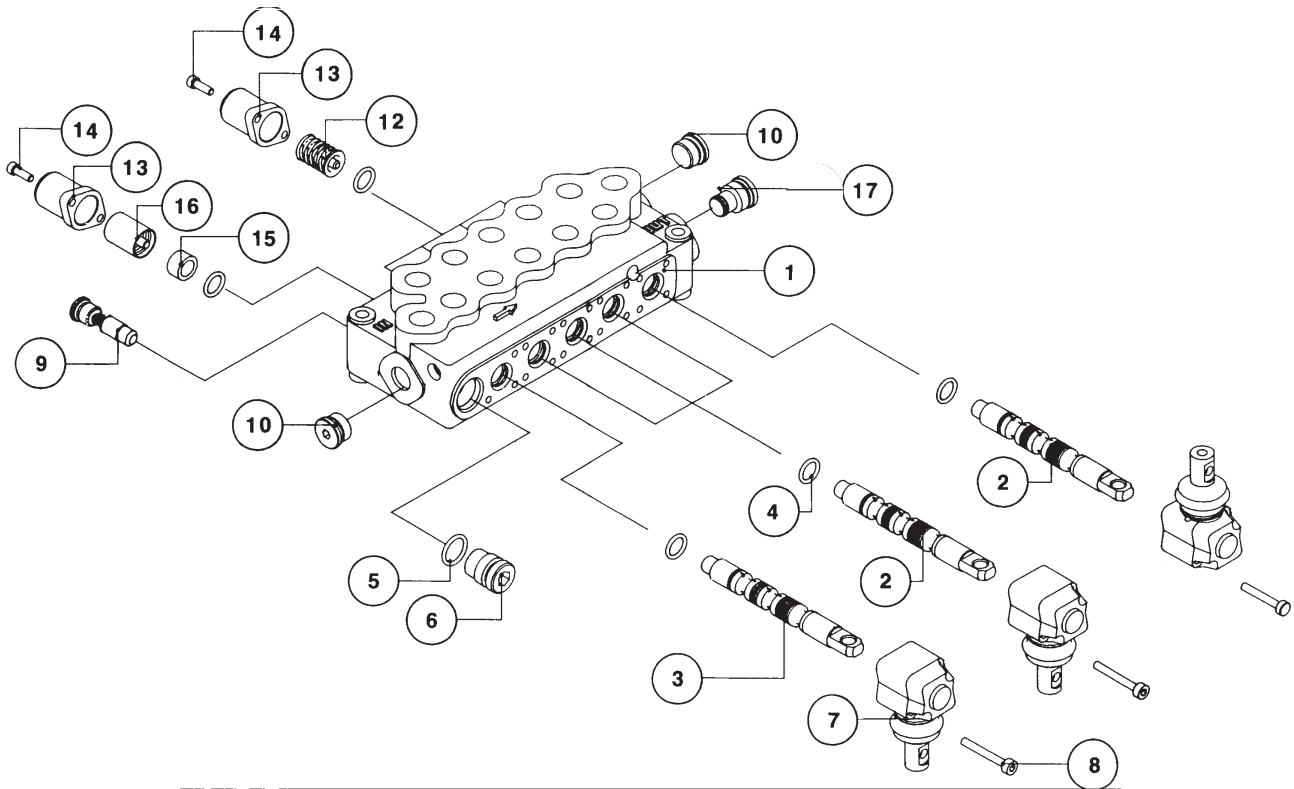
NOTE:  
\* INDICATES PART IS SHIPPED LOOSE.

-1			
-	G	-	-
-	F	-	-
-	E	-	-
*	3	D	7442-6
*	5	C	10424-10
*	1	B	54135-2
*	1	A	33999-DWG
QTY.	ITEM	PART NO.	DESCRIPTION

LIST OF MATERIAL

 <div>UNLESS OTHERWISE NOTED: TOLERANCES: FRACTIONS ± 1/16 ANGLES ± .1 XXX ± .005 MACHINED SURFACE FINISHES= 125 PROJECTION OF VIEWS ALL DIMENSIONS ARE IN INCHES</div>	MANUFACTURING COMPANY		WACO TEXAS		VALVE KIT LOWER CONTROLS	
	SEE LIST OF MATERIALS		EST WT # MANUAL		DWG. NO.	
	MATERIAL		SCALE		DATE	
	FINISH		SIZE		TITLE	
---	1 OF 1		—		33999—DWG	

**LOWER CONTROL VALVES WITH WINCH CONTROL  
PART NO. 54135-2**



**LOWER CONTROLS**

Item	Part No.	Description	Qty. 54135-2
1	X989-106	5 Spool Body	1
2	X989-86	Spool, Meter-out	3
3	X989-51	Spool, Selector	1
4	X989-15	O-Ring	10
5	X989-19	O-Ring	1
6	X989-21	Replacing Plug	1
7	X989-71	Lever	5
8	X989-32	Screw	10
9	X989-73	VR5 Kit	1
10	X989-17	Plug	2
12	X989-42	MD-Kit	4
13	X989-3	End Cap	5
14	X989-43	Screw	10
15	X989-69	Ring	1
16	X989-75	Kit	1
17	50190-1	Open Center Plug	1

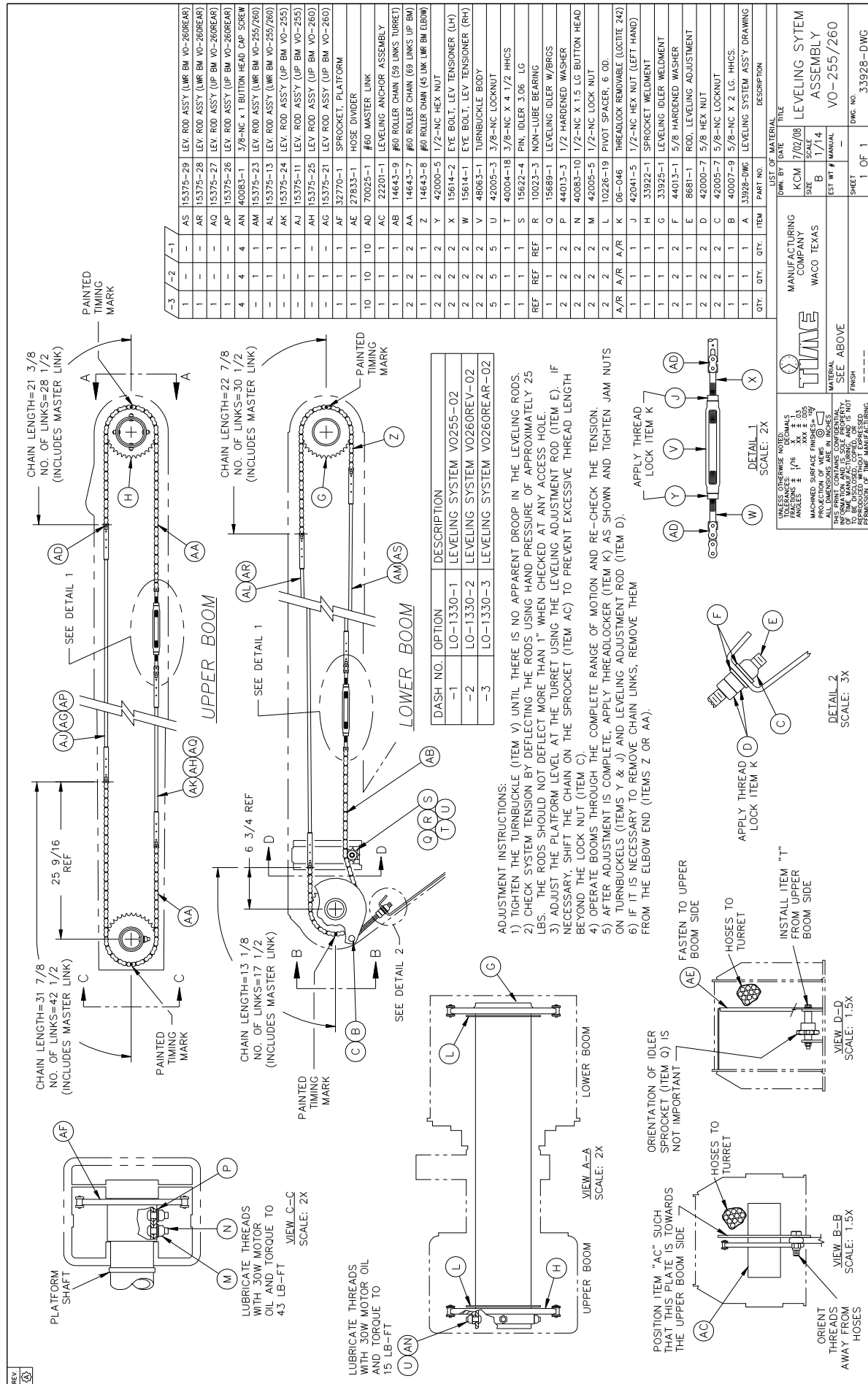
\*54135-2 Open Center System Valve

## SECTION 119

### LEVELING SYSTEM ASSEMBLY (OPTION LO-1330-2)

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.

## LEVELING SYSTEM



## SECTION 120

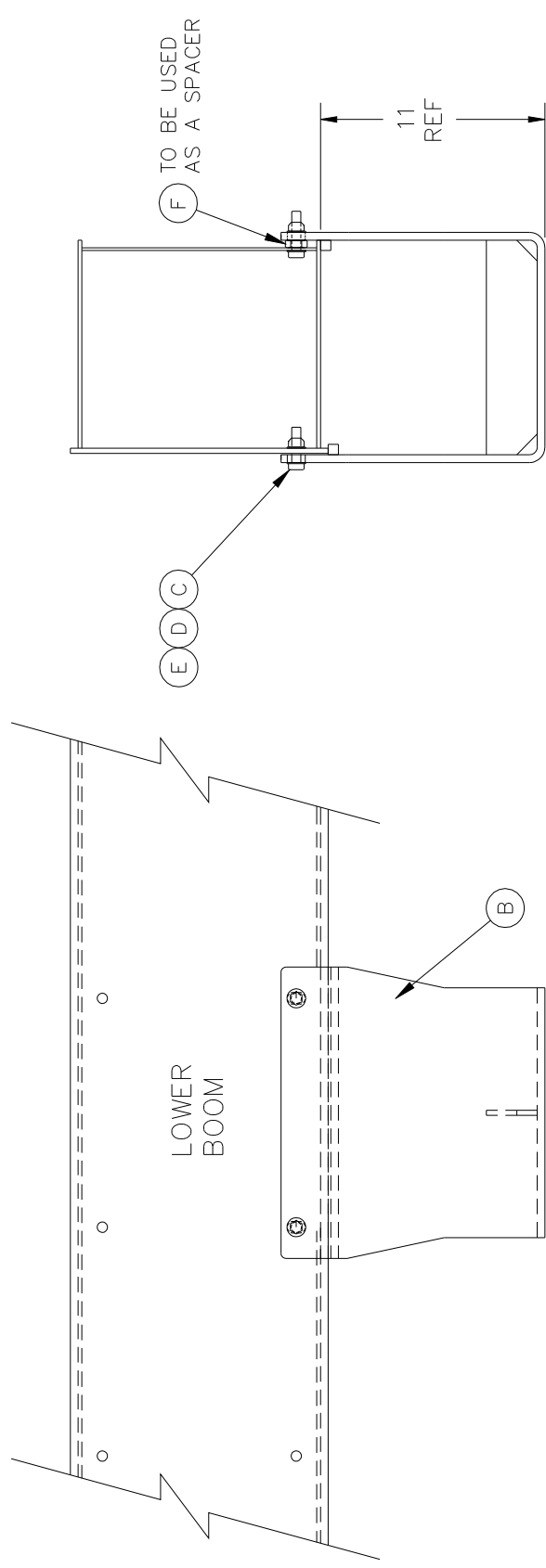
### LOWER BOOM REST, SLED ONLY (OPTION MH-1330-9)

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.

# LOWER BOOM REST

REV.

DASH NO.	DESCRIPTION	OPTION
-1	LOWER BOOM REST, SLED ONLY (11" TALL)	MH-1330-9



\* ITEMS TO BE SHIPPED LOOSE.

QTY.	ITEM	PART NO.	DESCRIPTION
2	F	42002-7	5/8-NC HEX JAM NUT
8	E	44013-9	7/16 HARDENED WASHER
4	D	42005-4	7/16-NC LOCK NUT
4	C	40005-7	7/16-NC x 1 1/2 HHCS
1	B	35865-1	LOWER BOOM SLED WELDMENT
1	A	35866-DWG	LOWER BOOM REST INSTALLATION

QTY.	ITEM	PART NO.	DESCRIPTION

- NOTES:
1. POSITION BOOM SLED WELDMENT (ITEM B) ON THE LOWER BOOM AS SHOWN. ALIGN WITH EXISTING HOLES AT THE DESIRED LOCATION OR MATCH DRILL NEW HOLES IF REQUIRED AND INSTALL FASTENERS AS SHOWN.

MANUFACTURING COMPANY  
WACO TEXAS

UNLESS OTHERWISE NOTED:  
TOLERANCES: FRACTIONS ± 1/16 DECIMALS X ± .03  
ANGLES ± .1° XX ± .005 XXX ± .005  
MACHINED SURFACE FINISHES = 125  
PROJECTION OF VIEWS = 1/8  
ALL DIMENSIONS ARE IN INCHES  
THIS PRINT CONTAINS CONFIDENTIAL INFORMATION AND ITS DISCLOSURE TO BE DISCLOSED, COPIED, OR REPRODUCED WITHOUT EXPRESSED PERMISSION OF TIME MANUFACTURING.

LIST OF MATERIAL

DWN. BY KCM  
DATE 09/15/10

SIZE A  
SCALE 1/8

EST. WT. #  
MANUAL

SHEET 1 OF 1

DWG. NO. 35866-DWG

TITLE  
LOWER BOOM REST  
INSTALLATION





## SECTION 121

### UPPER BOOM REST (OPTION MH-812)

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.



- 1) POSITION UPPER BOOM SO THAT PLATFORM HAS ADEQUATE CLEARANCE OVER THE CAB OR CABGUARD.
- 2) POSITION ITEM "A" AND "B" ALONG UPPER BOOM UNTIL ITEM "A" IS 1/2" FROM EDGE OF TURRET WING.
- 3) MARK HOLE LOCATIONS OF ITEM "A" ON TURRET WING.
- 4) RAISE UPPER BOOM.
- 5) DRILL TWO 17/32 DIA HOLES THROUGH THE TURRET WING.
- 6) INSTALL ITEMS A,B, & F USING HARDWARE SHOWN.

UNLESS OTHERWISE NOTED: TOLERANCES: 1/16 DECIMALS ANGLES ± .03 .XX ± .03 .XXX ± .005 .XXX ± .005		MANUFACTURING		UPPER BOOM
		COMPANY		REST
MACHINED SURFACE FINISHES= .002 PROJECTION OF VIEWS  ALL DIMENSIONS ARE IN INCHES	MATERIAL FINISH	WACO TEXAS		INSTALLATION
		SEE MATERIAL LIST		
		SIZE	SCALE	
		A	1/12	
		SHEET		DWG. NO. 22249-1
		1 OF 1		

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**SECTION 122**  
**PLATFORM SUPPORT S-STK BTWN**  
**BOOM & BUCKET W/ PLTFM TILT REV MT**  
**(OPTION PS-1330-12)**


When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.

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	LIST OF MATERIAL				TITLE	
	MANUFACTURING COMPANY WACO TEXAS	OWN. BY LBR 8-25-10	DATE SCALE 1=6	PLATFORM TILT ASSEMBLY		
REVISIONAL	EST WT	MANUAL				
		SHEET	1 OF 1		DWG. NO. 35715-DWC	

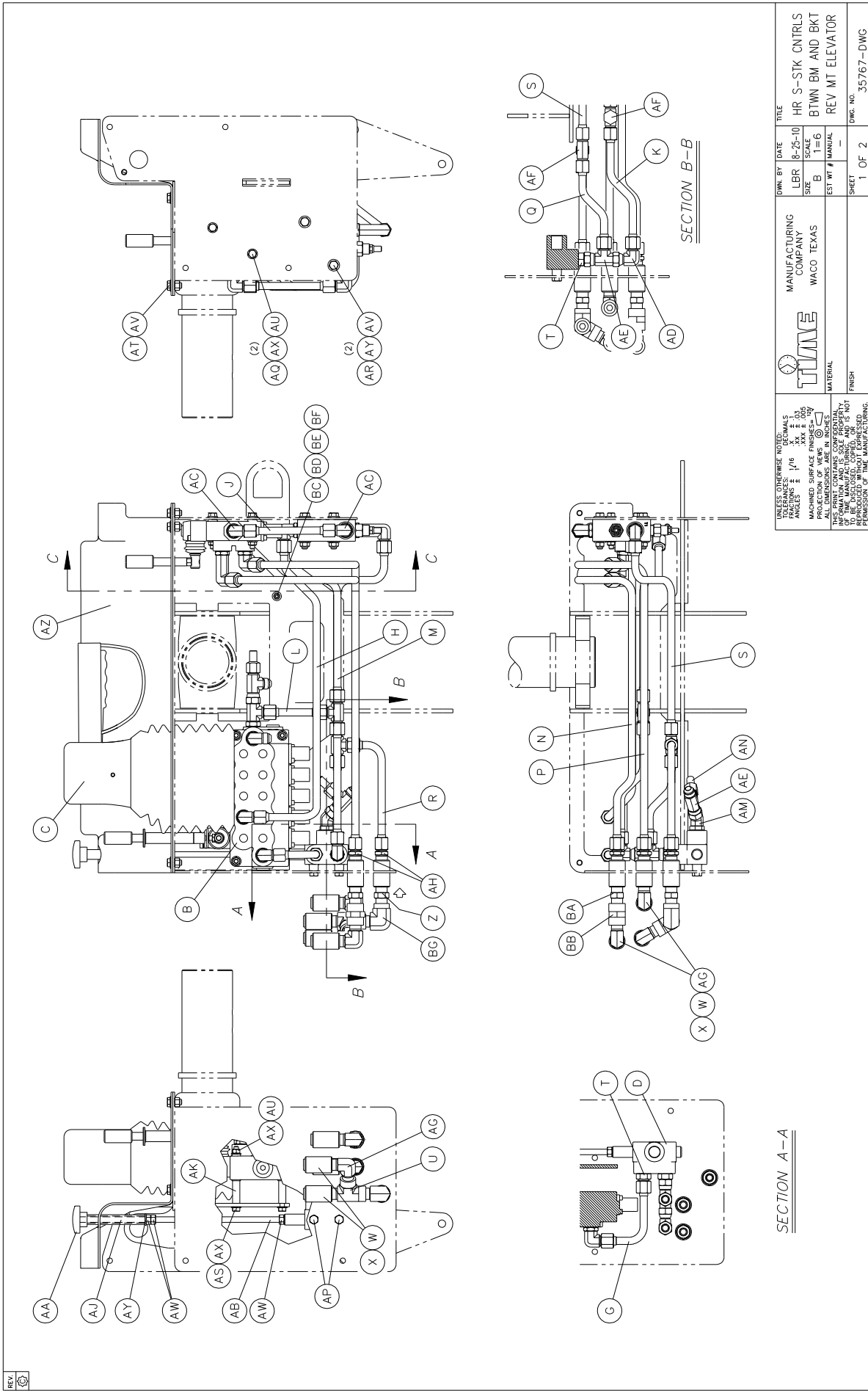
UNLESS OTHERWISE NOTED:  
TOLERANCES: DECIMALS  
FRACTIONS:  $\pm 1/16$   
ANGLES:  $\pm .03$   
XXX  $\pm .005$   
MACHINED SURFACE FINISHES =  $12\mu$   
PROJECTION OF VIEWS   
ALL DIMENSIONS ARE IN INCHES

## SECTION 123

### **HR SINGLE STICK CONTROLS REV MT BTWN BOOM & BUCKET W/ REG TOOL PRESS/FLOW (OPTION SC-1330-37)**

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.

# UPPER CONTROLS

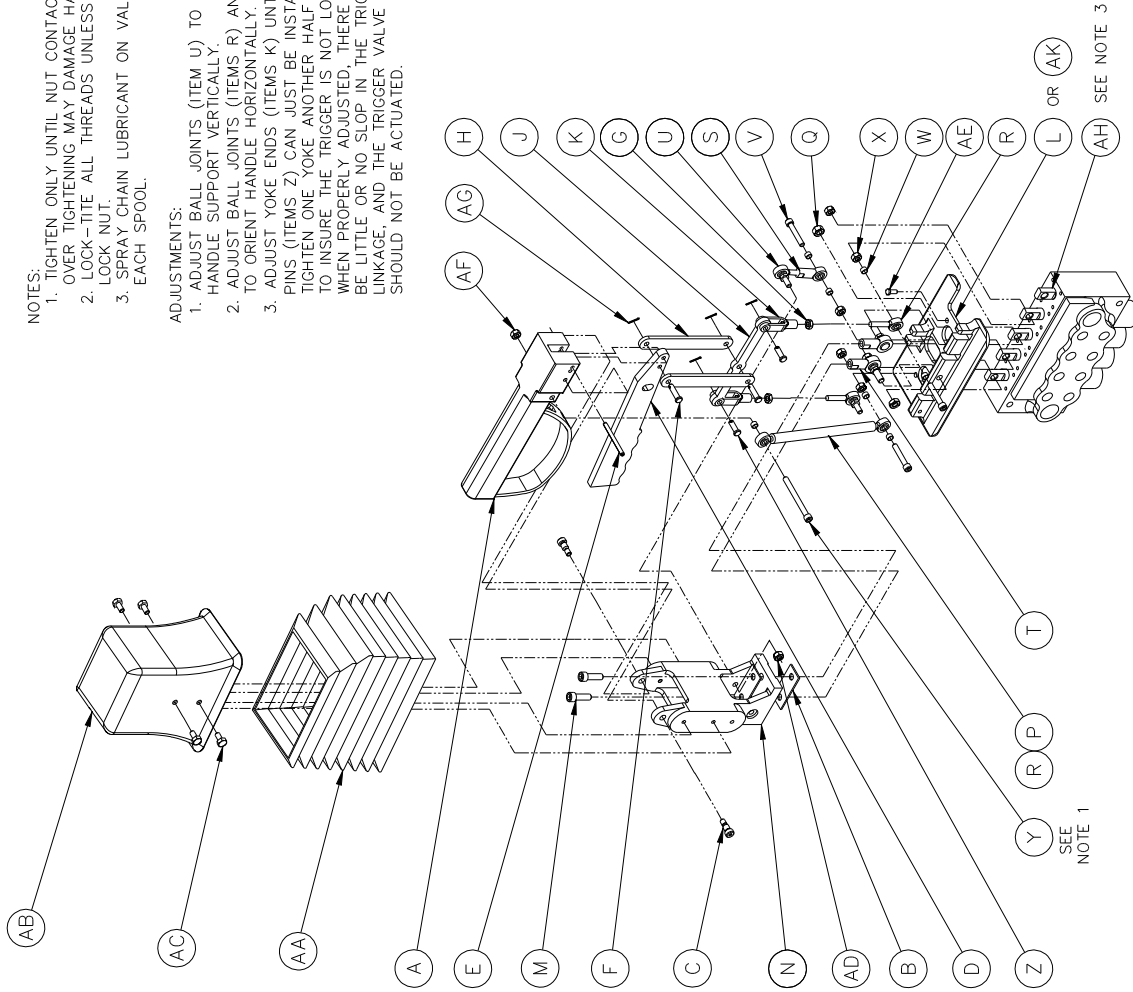


REV.	
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# UPPER CONTROLS



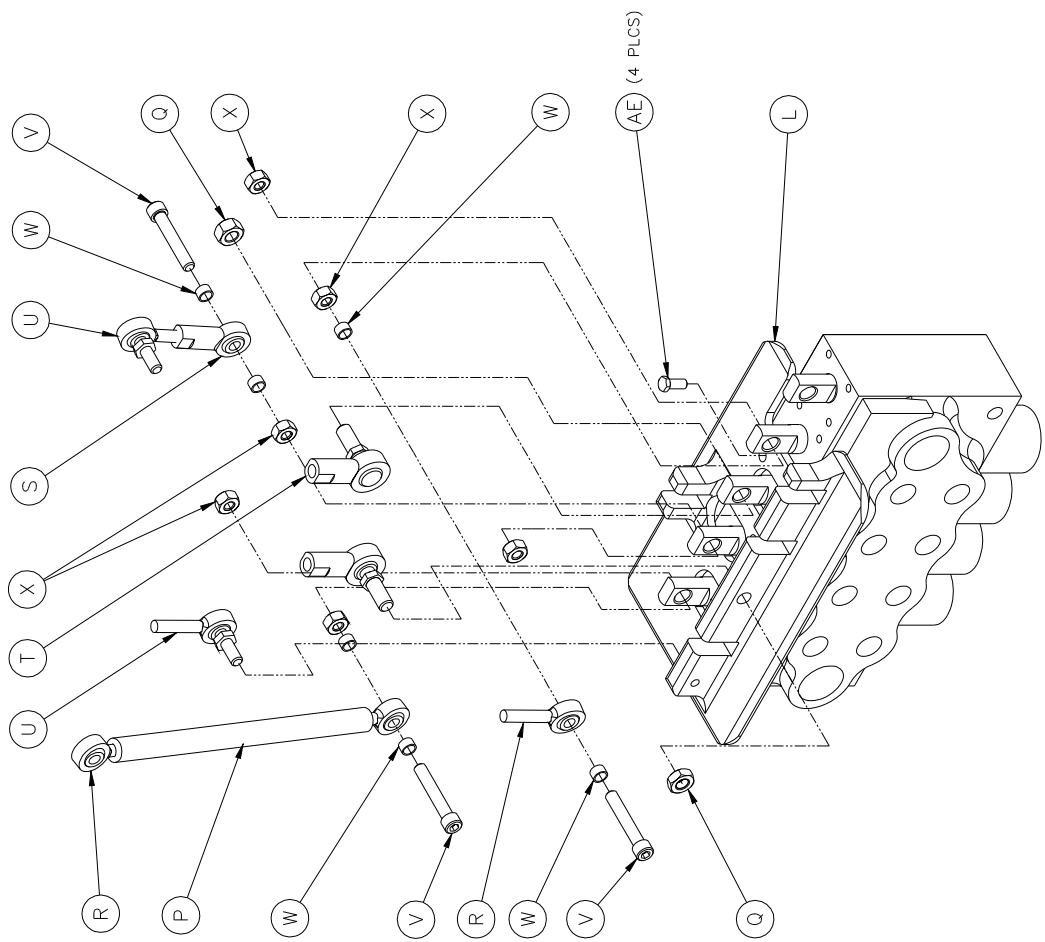
- NOTES:
1. TIGHTEN ONLY UNTIL NUT CONTACTS HANDLE. OVER TIGHTENING MAY DAMAGE HANDLE.
  2. LOCK-TITE ALL THREADS UNLESS SECURED BY LOCK NUT.
  3. SPRAY CHAIN LUBRICANT ON VALVE BODY AT EACH SPOOL.
- ADJUSTMENTS:
1. ADJUST BALL JOINTS (ITEM U) TO ORIENT HANDLE SUPPORT VERTICALLY.
  2. ADJUST BALL JOINTS (ITEMS R) AND ROD (ITEM P) TO ORIENT HANDLE HORIZONTALLY.
  3. ADJUST YOKE ENDS (ITEMS K) UNTIL CLEVIS PINS (ITEMS Z) CAN JUST BE INSTALLED. THEN TIGHTEN ONE YOKE ANOTHER HALF TURN TO INSURE THE TRIGGER IS NOT LOOSE. WHEN PROPERLY ADJUSTED, THERE SHOULD BE LITTLE OR NO SLOP IN THE TRIGGER LINKAGE. AND THE TRIGGER VALVE SPOOL SHOULD NOT BE ACTUATED.




-2		-1			
1	-	AK	14003-1	BASE PLATE SINGLE STICK (LH)	
A/R	A/R	AJ	06-046	THREADLOCK #250 (REMOVABLE)	
A/R	A/R	AH	05-094	LUBRIPLATE CHAIN LUBRICANT	
4	4	AG	45003-2	1/16 x 3/4" LG. COTTER PIN	
1	1	AF	42005-1	1/4-NC LOCKNUT	
4	4	AE	40117-1	M5 x .08 MM x 10MM LG. METRIC SCREW	
1	1	AD	42008-1	1/4-28NF THIN LOCK NUT	
4	4	AC	40016-4	1/4-20NC x 3/4 NYLON BOLT	
1	1	AB	34163-1	UNITROL 3 FUNC HR CTRL SHELL	
1	1	AA	34167-1	BOOT, INSULATED 3-AXIS	
2	2	Z	45002-31	1/4 x 51/64 CLEVIS PIN	
1	1	Y	40070-11	1/4 X 2 1/2 SHCS	
6	6	X	42000-1	1/4 HEX NUT	
7	7	W	12735-1	SPACER	
3	3	V	40070-7	1/4 x 1 1/2 SHCS	
2	2	U	72038-1	ROD END BALL JOINT	
2	2	T	72030-2	ROD END BALL JOINT	
1	1	S	72028-2	UNIBALL ROD END	
3	3	R	72046-1	ROD END BALL JOINT	
2	2	Q	42001-2	5/16 HEX NUT	
1	1	P	34113-2	CONTROL LINKAGE	
1	1	N	33174-1	3-AXIS CONTROL HANDLE BODY	
2	2	M	40125-5	5/16 x 1 SHCS	
-	1	L	12736-1	BASE PLATE SINGLE STICK (RH)	
2	2	K	89061-1	ADJUSTABLE YOKE END	
1	1	J	28489-1	SAFETY TRIGGER ARM	
2	2	H	33177-1	PLASTIC LINK	
5	5	G	42001-1	1/4 HEX NUT	
2	2	F	45002-37	1/4 x 1 CLEVIS PIN	
1	1	E	45008-31	ROLL PIN	
1	1	D	35482-1	TRIGGER, PLASTIC	
2	2	C	40116-1	5/16 DIA SHOULDER BOLT	
2	2	B	33401-1	BACKING PLATE	
1	1	A	33166-1	HANDLE, PLASTIC CONTROL	
QTY:	QTY:	ITEM	PART NO.	DESCRIPTION	

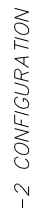
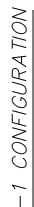
UNLESS OTHERWISE NOTED:  
 DIMENSIONS ARE IN INCHES  
 FRACTIONS ± 1/16  
 DECIMALS ± .005  
 ANGLES ± 1°  
 MACHINED SURFACE FINISH: .0005  
 UNLESS OTHERWISE NOTED:  
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 BY ANY MEANS, ELECTRONIC OR  
 MECHANICAL, INCLUDING  
 PHOTOCOPYING, RECORDING,  
 OR BY ANY INFORMATION  
 STORAGE AND RETRIEVAL  
 SYSTEM.

LIST OF MATERIAL		TITLE	
QTY:	ITEM	MANUFACTURING COMPANY	UNITLET HR
1	OF 2	WACO TEXAS	3-AXIS
1	OF 2	WACO TEXAS	ASSEMBLY
1	OF 2	WACO TEXAS	33654-DWG



VALVE ASSEMBLY DETAIL  
SCALE: 2.5x

<div>UNLESS OTHERWISE NOTED: TOLERANCES: FRACTIONS ± 1/6 DECIMALS ± .03 ANGLES ± .03 MACHINED SURFACE FINISHES: .003 PROJECTION OF VIEWS: 1/4 THIS PRINT CONTAINS CONFIDENTIAL INFORMATION. IT IS THE PROPERTY OF TIME MANUFACTURING, AND IS NOT TO BE REPRODUCED, COPIED, OR REPRODUCED WITHOUT EXPRESS PERMISSION OF TIME MANUFACTURING.</div>	<div> TIME</div>	MANUFACTURING COMPANY		TITLE UNITROL HR 3-AXIS ASSEMBLY DWG. NO. 33654-DWG
		WACO TEXAS		
		MATERIAL SEE ABOVE		
		FINISH		
DWG. BY	DATE	KCM	SCALE	SHEET 2 OF 2
W	02/11/08	B	1/6	
EST. WT. #	MANUAL			



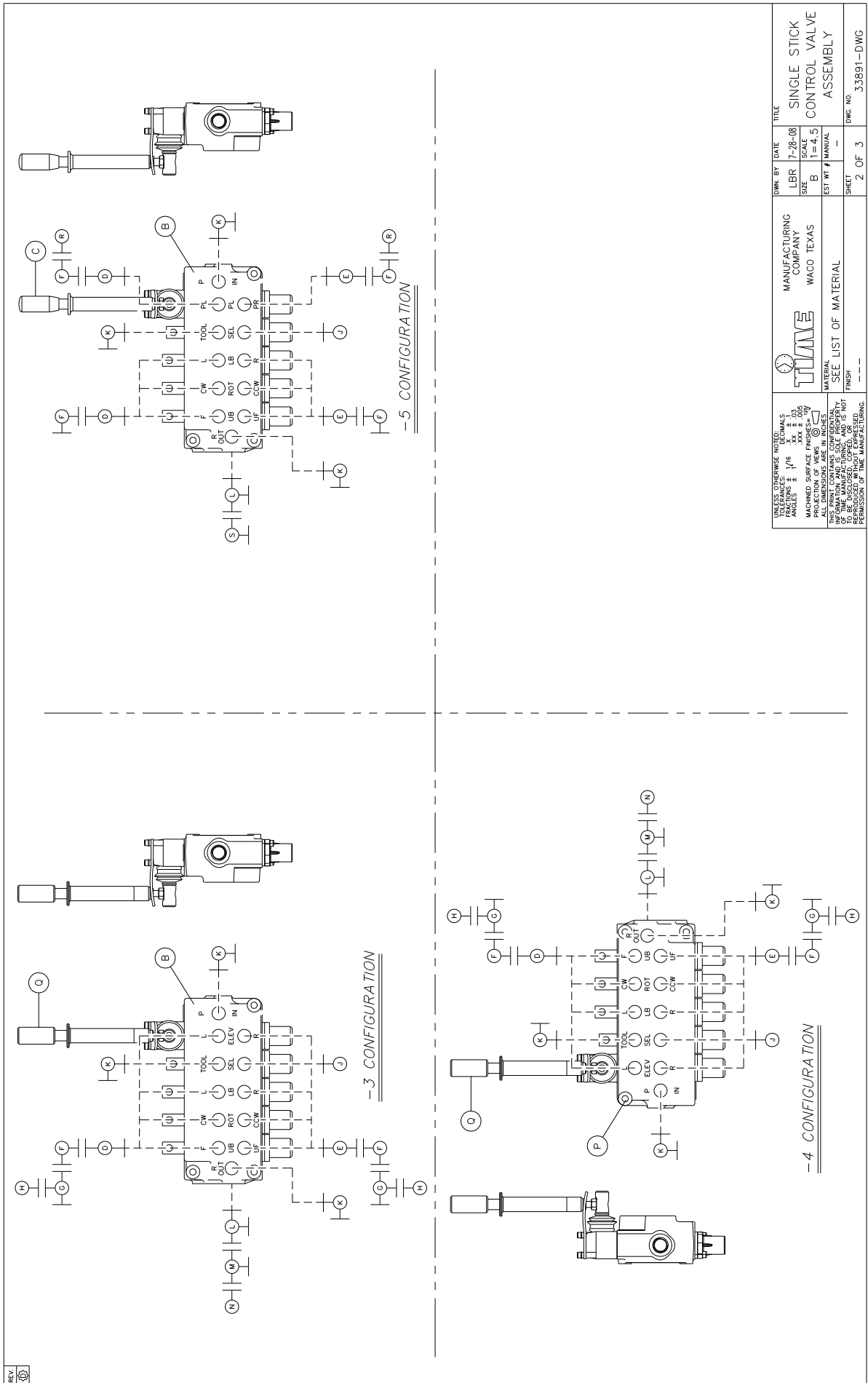
	-6	-5	-4	-3	-2	-1	
	1	1	-	-	-	-	S 50004-4 #8 JIC S.N. 90° ELBOW
	2	2	-	-	-	-	R 50114-1 3/8 JIC TO 1/4 JIC REDUCER
	1	-	1	1	-	-	Q 34141-1 H/R LOCKING LEVER KIT
	1	-	1	-	1	-	P 54327-1 SINGLE STICK CONT VLV (5 SPOOL)
	-	-	1	1	1	1	N 50189-3 #8 JIC FEMALE VACUUM BREAKER
	-	-	1	1	1	1	M 50048-3 #8 JIC S.N. RUN TEE
	1	1	1	1	1	1	L 50163-4 #8 O-RING TO #8 JIC RUN TEE
	3	3	3	3	3	3	K 50011-4 #8 O-RING TO #8 JIC 90° ELBOW
	1	1	1	1	1	1	J 50081-4 #8 O-RING PLUG
	-	-	8	8	8	8	H 50189-1 #6 JIC FEMALE VACUUM BREAKER
	-	-	8	8	8	8	G 50048-2 #6 JIC S.N. RUN TEE
	8	8	8	8	8	8	F 50004-3 #6 JIC S.N. 90° ELBOW
	4	4	4	4	4	4	E 50009-3 #6 O-RING TO #6 JIC STR CONN
	4	4	4	4	4	4	D 50046-1 #6 O-RING TO #6 JIC LG STR CONN
	-	1	-	-	1	1	C 58081-1 LOCKING LEVER KIT
	-	1	-	1	-	1	B 54326-1 SINGLE STICK CONT VLV (5 SPOOL)
	1	1	1	1	1	1	A 33891-DWG SINGLE STICK CONTROL VALVE ASSY
QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	ITEM PART NO. LIST OF MATERIAL

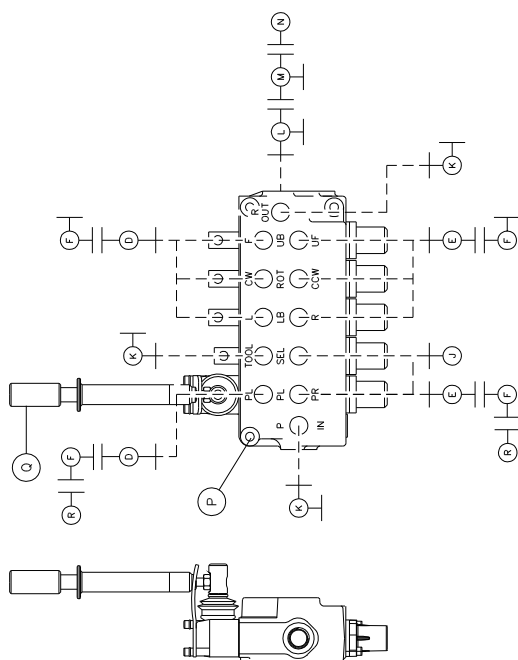
[illegible]



PARTS AND ASSEMBLIES

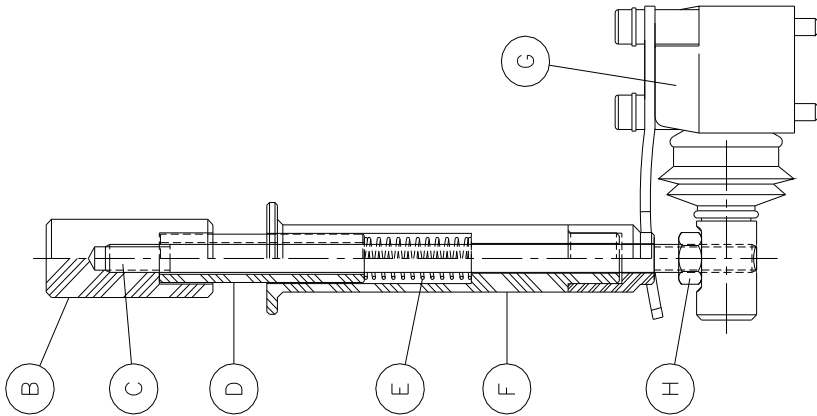
UPPER CONTROLS





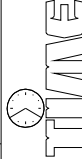
## -6 CONFIGURATION

[illegible]



-1

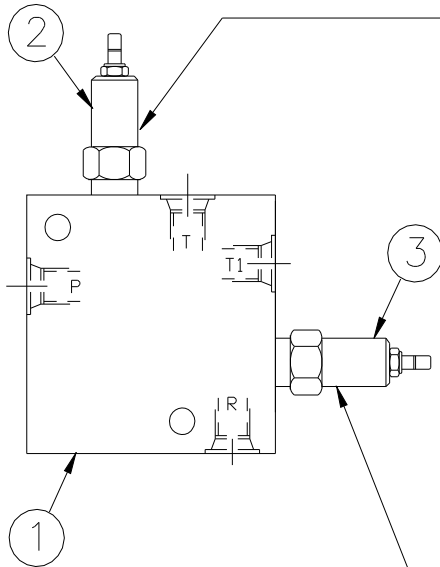
QTY.	ITEM	PART NO.	DESCRIPTION
1	H	42014-3	NUT M8 X 1.25
1	G	58082-1	LEVER CONTROL KIT
1	F	34140-1	HR LEVER SUB-ASSEMBLY
1	E	88002-1	COMPRESSION SPRING
1	D	34058-1	LOCKING HANDLE SLEEVE
1	C	34060-1	HANDLE ROD
1	B	34059-1	KNOB
1	A	34141-DWG	HR LOCKING LEVER ASSY

LIST OF MATERIAL			
	MANUFACTURING COMPANY		TITLE
	WACO TEXAS		HR LOCKING LEVER ASSEMBLY
	MATERIAL		EST WT # MANUAL
	FINISH		SHEET 1 OF 1 DWG. NO. 34141-DWG

UNLESS OTHERWISE NOTED:  
TOLERANCES: DECIMALS  
FRACTIONS: 1/16  
ANGLES: .XX ± .03  
.XXX ± .005  
MACHINED SURFACE FINISHES= 125/  
PROJECTION OF VIEWS  
ALL DIMENSIONS ARE IN INCHES  
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PERMISSION OF TIME MANUFACTURING.

REV.  
B

# TOOL VALVE PARTS AND ADJUSTMENT P/N 54230-1, -2



## PRESSURE REDUCING CARTRIDGE ADJUSTMENT

1. PRESET AT 2000 PSI BUT CAN BE ADJUSTED FROM 100 TO 3000 PSI.
2. LOOSEN JAM NUT.
3. TURN SET SCREW TO DESIRED PRESSURE SETTING. (CLOCKWISE TO INCREASE SETTING)
4. TIGHTEN JAM NUT.

## FLOW CONTROL CARTRIDGE ADJUSTMENT

1. PRESET AT 5 GPM BUT CAN BE ADJUSTED  $\pm 25\%$  OF SETTING (3.75 GPM TO 6.25 GPM).
2. LOOSEN JAM NUT.
3. TURN SET SCREW TO DESIRED FLOW RATE SETTING. (CLOCKWISE TO INCREASE SETTING)
4. TIGHTEN JAM NUT.


NOTE: TOOL VALVE IS USED ON THE UPPER CONTROLS AND WITH OPTIONAL TOOLS AT THE GROUND CONTROLS.

### SERVICE PARTS

ITEM	PART DESCRIPTION	TIME PART NO.	54230-1 QTY	54230-2 QTY
1	BODY	Y1533	1	1
2	REDUCING VALVE CARTRIDGE	Y1532	1	1
3	FLOW CONTROL VALVE CARTRIDGE	Y1534	-	1

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UPPER CONTROLS

UNLESS OTHERWISE NOTED:  
TOLERANCES: DECIMALS  
FRACTIONS  $\pm 1/16$  .X  $\pm .1$   
ANGLES  $\pm 1^\circ$  .XX  $\pm .03$   
                                  .XXX  $\pm .005$   
  
MACHINED SURFACE FINISHES=  $125\sqrt{}$   
PROJECTION OF VIEWS   
ALL DIMENSIONS ARE IN INCHES



MANUFACTURING  
COMPANY  
WACO TEXAS

MATERIAL  
SEE MATERIAL LIST  
FINISH

DWN. BY MG	DATE 11-16-99
CHKD. BY	DATE
SIZE A	SCALE N/A
SHEET 2 OF 2	

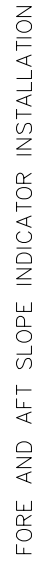
TITLE  
TOOL  
VALVE

DWG. NO.  
54230- SEE ABOVE


## SECTION 124

### SLOPE INDICATOR INSTALLATION (OPTION SD-1200-13)

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.



\* THESE ITEMS TO BE SHIPPED LOOSE.

* THESE ITEMS TO BE SHIPPED LOOSE.														
-4 -3 -2 -1			QTY.		QTY.		ITEM		PART NO.		LIST OF MATERIAL			
2	-	-	-				G	33656-4	DECAL, SLOPE WARNING O/R (SPAN)	<div><p>MANUFACTURING COMPANY WACO TEXAS</p><p>DATE APR 12/20/07</p><p>SCALE B</p><p>EST W/1 MANUAL N/A</p><p>SHEET 1 OF 1</p><p>DWG. NO. 33658-DWG</p></div>				
-	2	-	-				F	33656-2	DECAL, SLOPE WARNING (SPANISH)					
-	-	2	-				E	33656-3	DECAL, SLOPE WARNING O/R					
2	-	2	-				D	33657-2	SLOPE INDICATOR (O/R)					
-	-	-	2				C	33656-1	DECAL, SLOPE WARNING					
-	-	2	-				B	33657-1	SLOPE INDICATOR					
1	1	1	1				A	33658-DWG	SLOPE INDICATOR INSTALLATION					
QTY.	QTY.	QTY.	QTY.											

DASH NO.	DESCRIPTION	OPTION
-1	SLOPE INDICATORS (W/O OUTRIGGERS)	ENGLISH SD-1200-8
-2	SLOPE INDICATORS (WITH OUTRIGGERS)	ENGLISH SD-1200-13
-3	SLOPE INDICATORS (W/O OUTRIGGERS)	SPANISH SD-1200-14
4	SLOPE INDICATORS (WITH OUTRIGGERS)	SPANISH SD-1200-15

## SECTION 125

### UPPER BOOM ASSEMBLY (OPTION UB-1330-2)

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.

UPPER BOOM

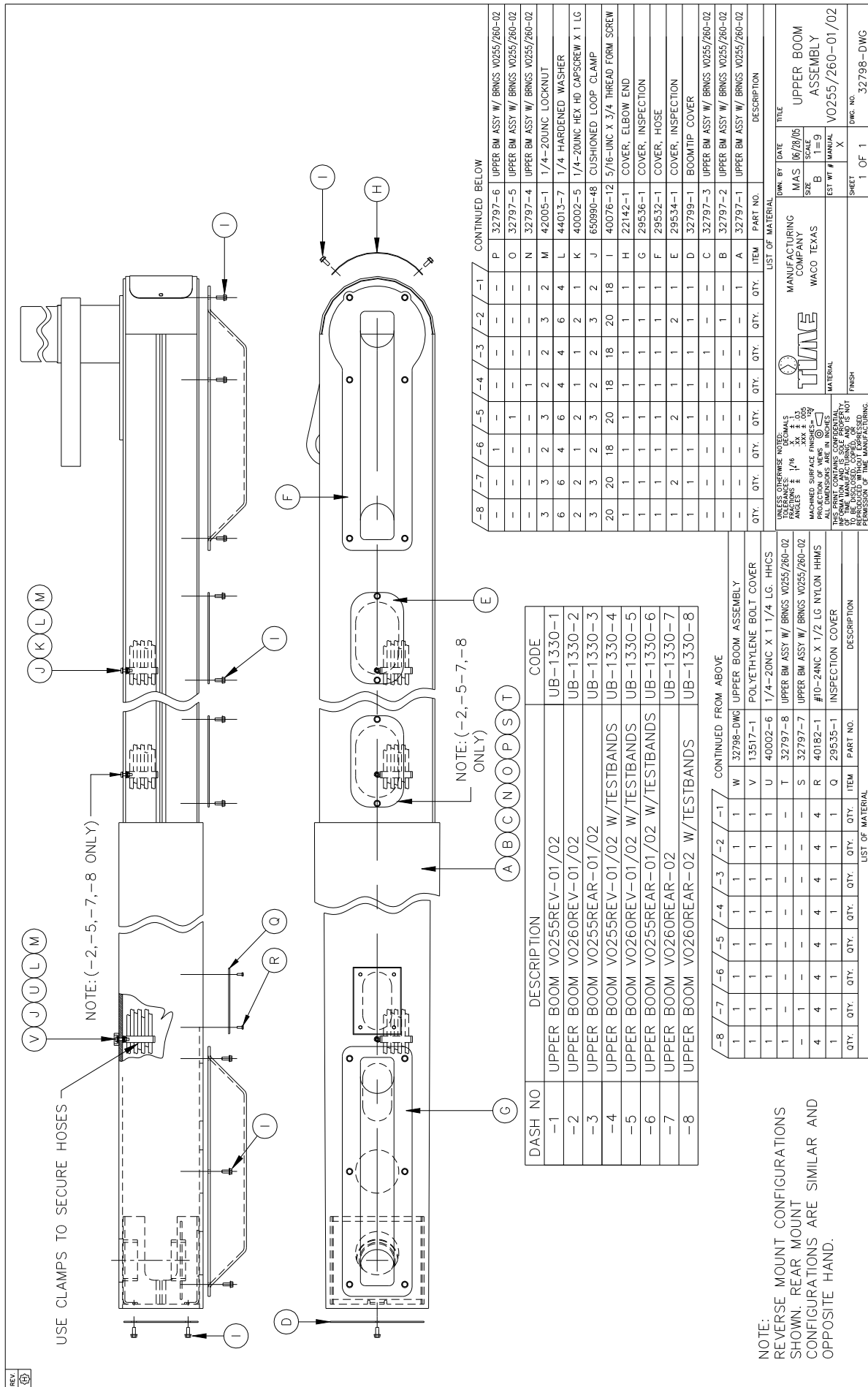
PARTS AND ASSEMBLIES

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## PARTS AND ASSEMBLIES


## UPPER BOOM





-8	-7	-6	-5	-4	-3	-2	-1
----	----	----	----	----	----	----	----

NOTE:  
REVERSE MOUNT CONFIGURATIONS SHOWN.  
REAR MOUNT CONFIGURATIONS ARE SIMILAR  
AND OPPOSITE HAND.

UNLESS OTHERWISE NOTED, TOLERANCES ± DECIMALS FRACTIONS ± 1/16 ANGLES ± 1° .XX ± .02 .XXX ± .05 MACHINED SURFACE FINISHES = 125 PROJECTION OF VIEWS ALL DIMENSIONS ARE IN INCHES	 MANUFACTURING COMPANY WACO TEXAS	DWN. BY DATE MAS 06/28/05 SIZE SCALE A 1/13 EST WT # MANUAL	TITLE UPPER BOOM ASSY W/ BRGS V0255/260-02
THIS DRAWING CONTAINS CONFIDENTIAL INFORMATION. THIS PROPERTY OF TIME MANUFACTURING, AND IS NOT TO BE DISCLOSED, COPIED, REPRODUCED, OR TRANSMITTED IN ANY FORM OR BY ANY MEANS WITHOUT THE WRITTEN PERMISSION OF TIME MANUFACTURING.	FINISH	SHEET 1 OF 1	DWG. NO. 32797-SEE ABOVE

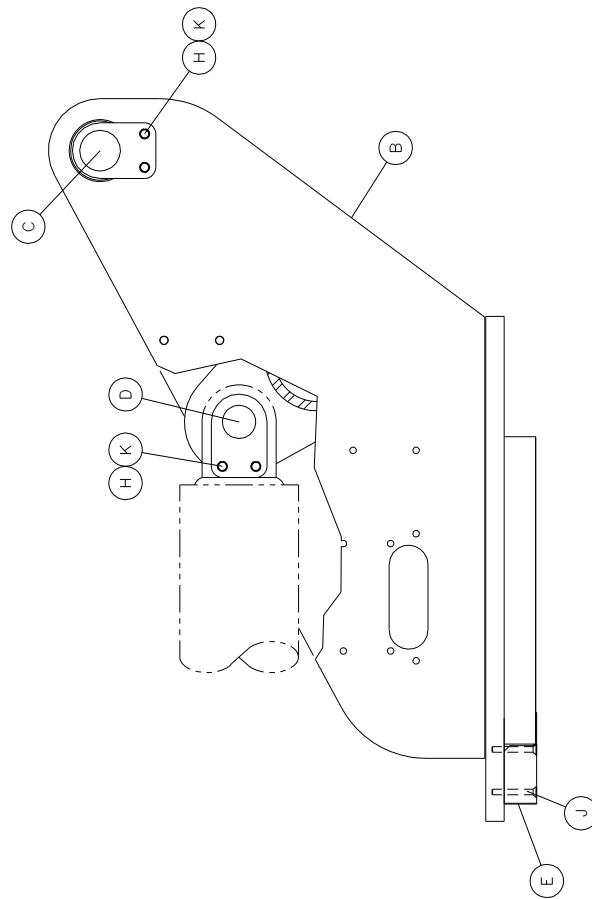
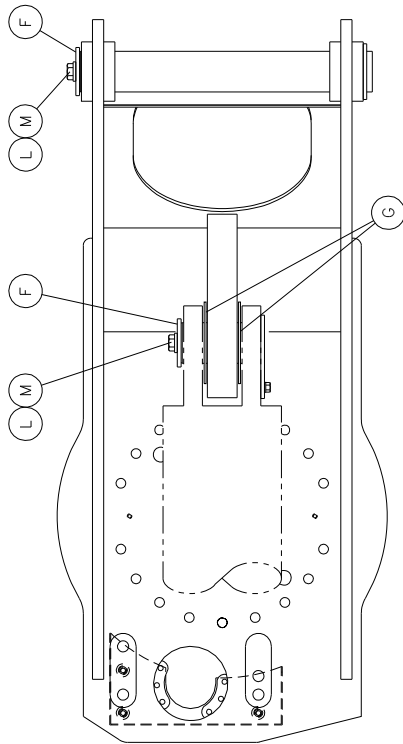
## SECTION 126

### **TURRET ASSEMBLY (OPTION TT-1330-1)**

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.



**TURRET**



NOTE:  
TORQUE ITEMS "H" AND "L" PER TMC-778  
AND APPLY TORQUE SEAL ITEM "N".

UNLESS OTHERWISE NOTED: DIMENSIONS ARE IN INCHES		DRAWN BY DATE		TITLE	
TOLERANCES: ± 1/16"		MANUFACTURING COMPANY		TURRET ASSEMBLY	
ANGLES: XXX ± .005		WACO TEXAS		SCALE: 1"=8"	
MACHINED SURFACE FINISH: 32		EST. WT. #		MANUAL	
ALL DIMENSIONS ARE IN INCHES		MATERIAL		SHEET	
THIS PART CONTAINS CONFIDENTIAL INFORMATION OF THE MANUFACTURER, AND IS NOT TO BE REPRODUCED, COPIED, OR OTHERWISE REPRODUCED WITHOUT EXPRESS WRITTEN PERMISSION OF THE MANUFACTURER.		SEE LIST OF MATERIAL		DWG. NO. 20570-DWG	
		FINISH		1 OF 1	
LIST OF MATERIAL					

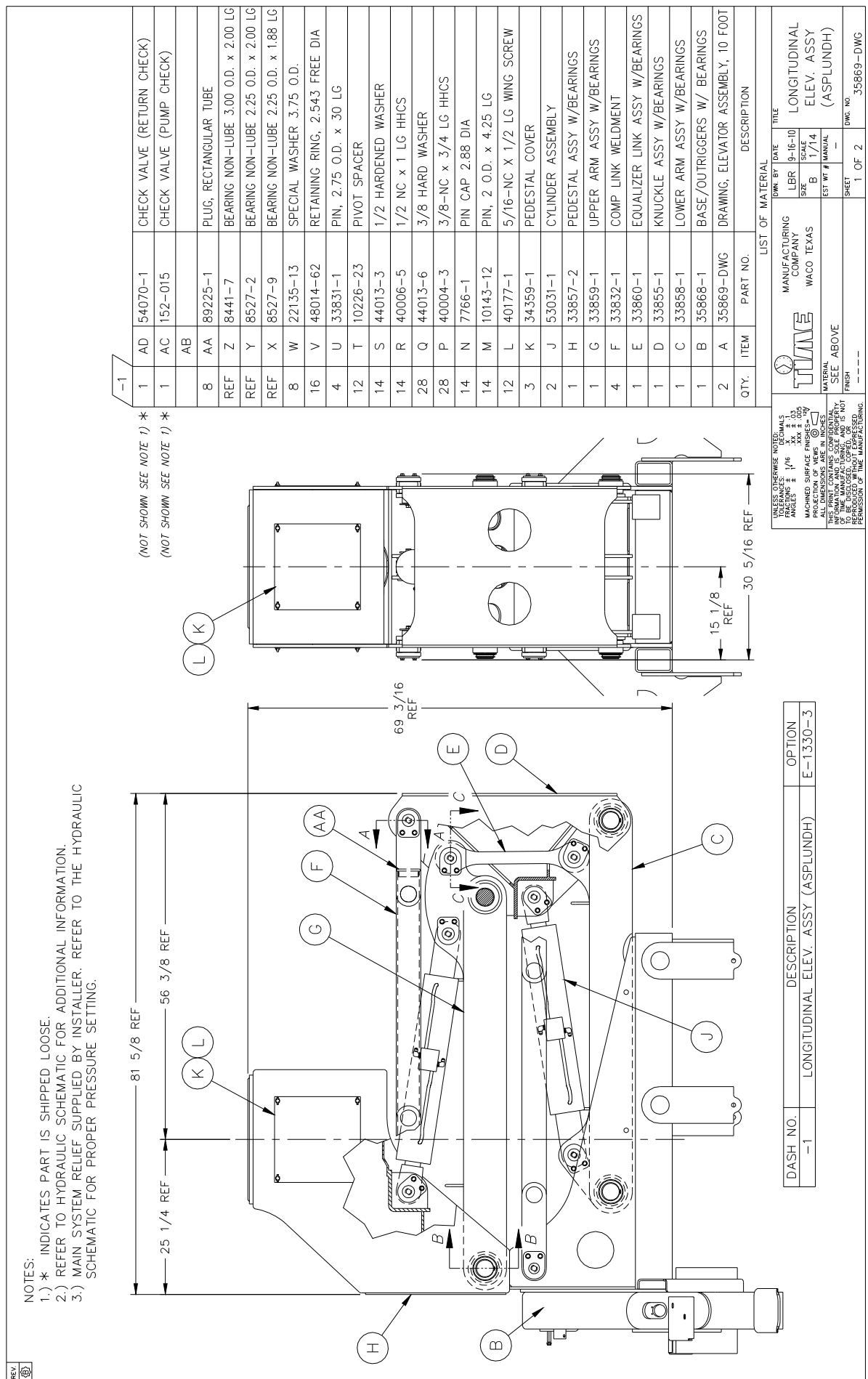
## SECTION 127

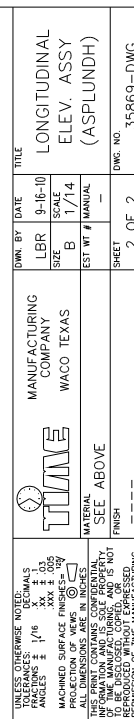
### LONGITUDINAL ELEVATOR ASSEMBLY (OPTION E-1330-3)

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.

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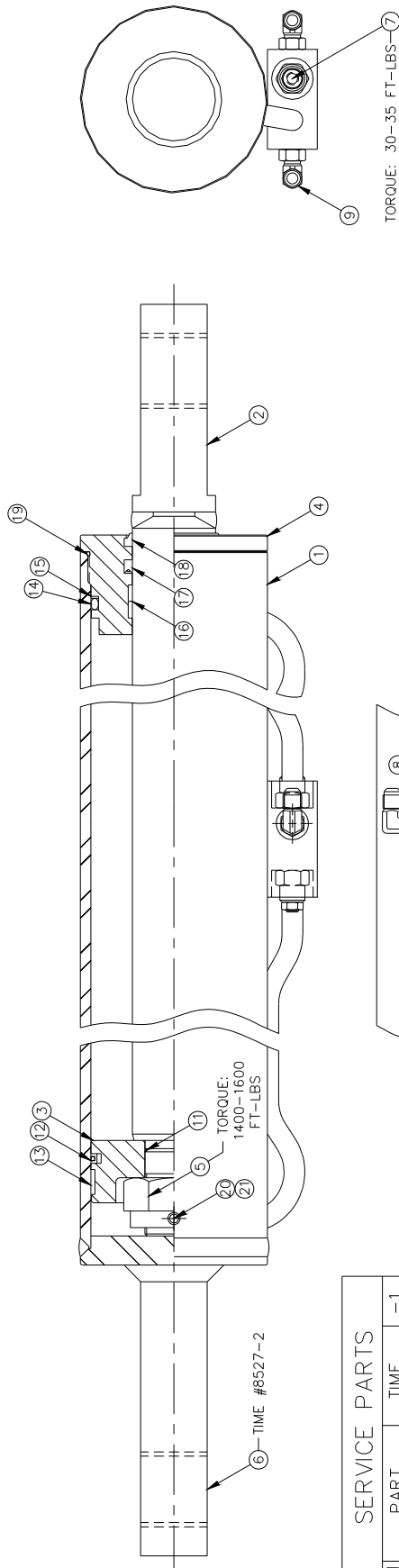






## CYLINDERS


# ELEVATOR CYLINDER ASSEMBLY



SERVICE PARTS			
ITEM SERIAL SHT 2	PART DESCRIPTION	TIME PART NO	-1 QTY
1	TUBE ASSEMBLY	Y2721	1
2	ROD ASSEMBLY	Y2722	1
3	PISTON	Y2723	1
4	HEAD	Y2724	1
5	LOCKNUT	Y2725	1
6	BEARING	8527-2	2
7	C'BALANCE VALVE	Y2626	2
8	BLEEDER PLUG	Y2662	2
9	ELBOW	Y2611	2
11	O-RING	NSS	1
12	AQ SEAL	NSS	1
13	WEAR RING	NSS	1
14	O-RING	NSS	1
15	BACK-UP RING	NSS	1
16	WEAR RING	NSS	2
17	POLYPAK	NSS	1
18	WIPER	NSS	1
19	O-RING	NSS	1
--	SEAL KIT	Y2726	1
20	NYLON PLUG	Y2260	1
21	SET SCREW	Y2523	1

\* THESE ITEMS ARE INCLUDED IN SEAL KIT.  
NSS (NOT SOLD SEPARATELY)

**\*\* THESE ITEMS ARE NOT INCLUDED IN SEAL KIT BUT MUST BE REPLACED WHEN REPLACING SEAL KIT AND MUST BE PURCHASED SEPARATELY.**

UNLESS OTHERWISE NOTED: TOLERANCES: DECIMALS FRACTIONS: 1/16 XX 1/32 ANGLES: 1/2° 1/4° 1/8° FINISH: 1/16" 1/32" 1/64"		MANUFACTURING COMPANY WACO TEXAS	DWN BY DATE KCM 08/25/08 SKM 5/21/25 EST W # MANUAL	TITLE CYLINDER ASSEMBLY, ELEVATOR
ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED INFORMATION CONTAINED HEREON IS FOR THE USE OF THE MANUFACTURER OF THE EQUIPMENT TO WHICH THE EQUIPMENT IS TO BE MANUFACTURED, AND IS NOT TO BE REPRODUCED OR USED FOR THE REPRODUCTION OF THE MANUFACTURING	MATERIAL FINISH	SHEET 2 OF 2	DWG. NO. 53031-1	

## PARTS AND ASSEMBLIES

## CYLINDERS



## SECTION 128

### ELEVATOR HOSE KIT (OPTION HK-1330-18)

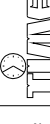
When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.

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DASH NO.	DESCRIPTION	CODE
-1	ELEVATOR HOSE KIT V0265E/270E	HK-1330-18

-1		H		89088-29	HOSE SLEEVE 1.25 X 149 LG
1		G		89088-28	HOSE SLEEVE 1.25 X 208 LG
1		F		89164-10	HOSE SLEEVE 2.96 X 209 LG
8		E		55678-1	1/4 I.D. HOSE ASSY X (252 LG.)
2		D		3281-58	3/8 I.D. HOSE ASSY X (252 LG.)
2		C		3281-57	3/8 I.D. HOSE ASSY X (170 LG.)
3		B		5960-28	1/2 I.D. HOSE ASSY X (252 LG.)
1		A		33878-DWG	ELEVATOR HOSE KIT
QTY.	ITEM	PART NO.		DESCRIPTION	
LIST OF MATERIAL					
UNLESS OTHERWISE NOTED, DIMENSIONS ARE IN INCHES. FRACTIONS ± 1/16. ANGLES ± 1/4°. MACHINED SURFACE FINISHES: .005. ALL DIMENSIONS ARE IN INCHES. THIS DRAWING IS THE PROPERTY OF THE MANUFACTURER AND IS NOT TO BE REPRODUCED OR COPIED WITHOUT THE WRITTEN PERMISSION OF THE MANUFACTURER.					
		MANUFACTURING COMPANY		ELEVATOR	
		WACO TEXAS		HOSE KIT	
MATERIAL		OWN BY DATE		V0265E/270E	
		LBR 7-28-08			
		SIZE		SCALE	
		B 1=12			
		EST WT		MANUAL	
		—		—	
FINISH		SHEET		DWG. NO.	
---		1		33878-DWG	
---		OF 2			

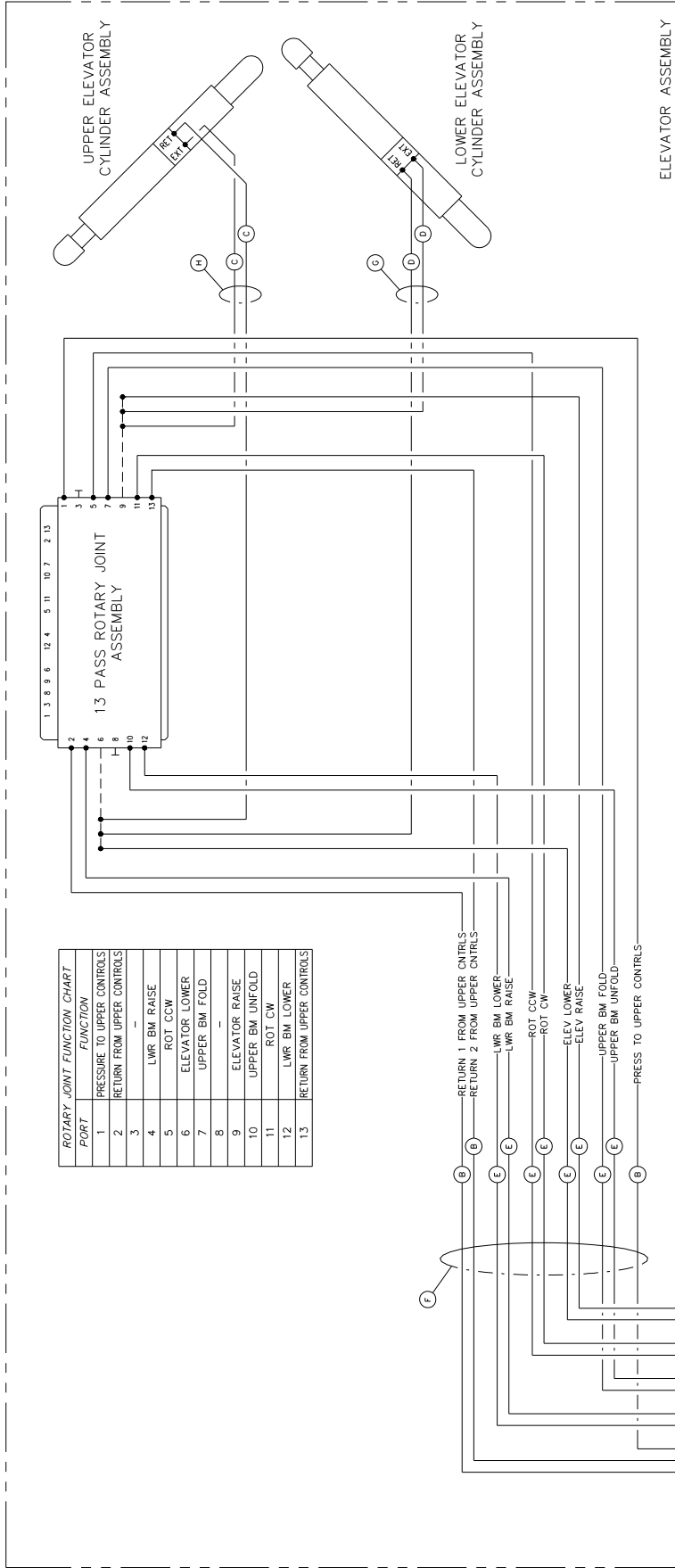
PARTS AND ASSEMBLIES

HOSE KIT

# HOSE KIT

REV. 1

3



PORT	FUNCTION
1	PRESSURE TO UPPER CONTROLS
2	RETURN FROM UPPER CONTROLS
3	—
4	LWR BM RAISE
5	ROT CCW
6	ELEVATOR LOWER
7	UPPER BM FOLD
8	—
9	ELEVATOR RAISE
10	UPPER BM UNFOLD
11	ROT CW
12	LWR BM LOWER
13	RETURN FROM UPPER CONTROLS

UNLESS OTHERWISE NOTED:	DECIMALS	DATE	TITLE
TOLERANCES:	XX.XX ± .005	LBR 7-28-08	ELEVATOR
ANGLES:	XX ± 1°	SIZE B	HOSE KIT
MACHINED SURFACE FINISHES:	XX ± .005	SCALE 1"=12"	V026E5/270E
PRODUCTION OF VIEWS:	XX ± .005	EST WT #	MANUAL
THIS PRINT CONTAINS CONFIDENTIAL INFORMATION AND IS NOT TO BE REPRODUCED OR USED IN ANY MANNER WITHOUT THE EXPRESS PERMISSION OF TIME MANUFACTURING.	XX ± .005	SHEET 2 OF 2	DWG. NO. 33878-DWG



## SECTION 129

# ELEVATOR MOUNTING HARDWARE (OPTION MH-1330-10)

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.



## SECTION 130

### **OUTRIGGER ASSEMBLY (OPTION OR-1400-49)**

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.

OUTRIGGER ASSEMBLY

PARTS AND ASSEMBLIES

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REV. 58694

ERCN NO.

DESCRIPTION

BY

CHKD.

APPR.

DATE

58694

FIRST RELEASE

LBR

DJH

SRS

9-16-10

OR-1400-49

APPLICATION NOTES

THIS OUTRIGGER OPTION IS THE SAME AS OR-1400-43 LESS OUTRIGGER A-FRAME WELDMENT

FOR USE ON THE FOLLOWING UNITS:  
LIFT MAIN AUXILIARY  
VO-265E YES YES  
VO-270E YES YES

OR-1400-49 IS DESIGNED FOR USE ON A 35" - 41" FRAME HT RESULTING IN 5" - 11" OF PENETRATION

1

REF

M

REF

OUTRIGGER PIN (INTERLOCK)

4

REF

L

REF

OUTRIGGER PIN

2

K

44013-6

3/8 HARDENED WASHER

2

J

40004-3

3/8-16NC x 3/4 LG HHCS

1

H

18935-1

OUTRIGGER COVER

4

G

50045-3

#06 JIC CAP

4

F

50011-3

#06 O-RING TO #06 JIC 90° ELBOW

2

E

12196-1

OUTRIGGER SLIDE PAD

2

D

45008-23

ROLL PIN 1/4 X 2 1/2 LG.

2

C

14285-1

INNER LEG ASS'Y WITH PIVOT FOOT

-

B

-

OUTRIGGER A-FRAME WELDMENT

1

A

35870-DWG

OUTRIGGER ASSEMBLY (PIVOT FOOT)

QTY.

ITEM

PART NO.

DESCRIPTION

UNLESS OTHERWISE NOTED:  
TOLERANCES: DECIMALS  
FRACTIONS: 1/16  
ANGLES: ± .03  
XXX ± .005  
MACHINED SURFACE FINISHES= 125  
PROJECTION OF VIEWS  
ALL DIMENSIONS ARE IN INCHES

THIS PRINT CONTAINS CONFIDENTIAL INFORMATION AND THE PROPERTY OF TIME MANUFACTURING AND IS NOT TO BE DISCLOSED, COPIED, OR REPRODUCED WITHOUT EXPRESSED PERMISSION OF TIME MANUFACTURING.

TIME

MANUFACTURING COMPANY

WACO TEXAS

DATE

9-16-10

SCALE

1/30

EST WT #

MANUAL

SHEET

1

OF

1

DWG. NO.

35870-DWG

NOTES:

1. APPLICATION NOTES ARE FOR REFERENCE ONLY. CONSULT SERVICE AND INSTALLATION MANUAL FOR MORE INFORMATION. OTHER APPLICATIONS NOT LISTED ARE POSSIBLE. CONSULT FACTORY.

2. ALL DIMENSIONS REFERENCE.

OR-1400-49

APPLICATION NOTES

THIS OUTRIGGER OPTION IS THE SAME AS OR-1400-43 LESS OUTRIGGER A-FRAME WELDMENT

FOR USE ON THE FOLLOWING UNITS:  
LIFT MAIN AUXILIARY  
VO-265E YES YES  
VO-270E YES YES

OR-1400-49 IS DESIGNED FOR USE ON A 35" - 41" FRAME HT RESULTING IN 5" - 11" OF PENETRATION

15

45°

99 15/16

155 1/4

46 1/4

9

24 13/16

19

B

F

G

D

L

M

J

K

H

E

C

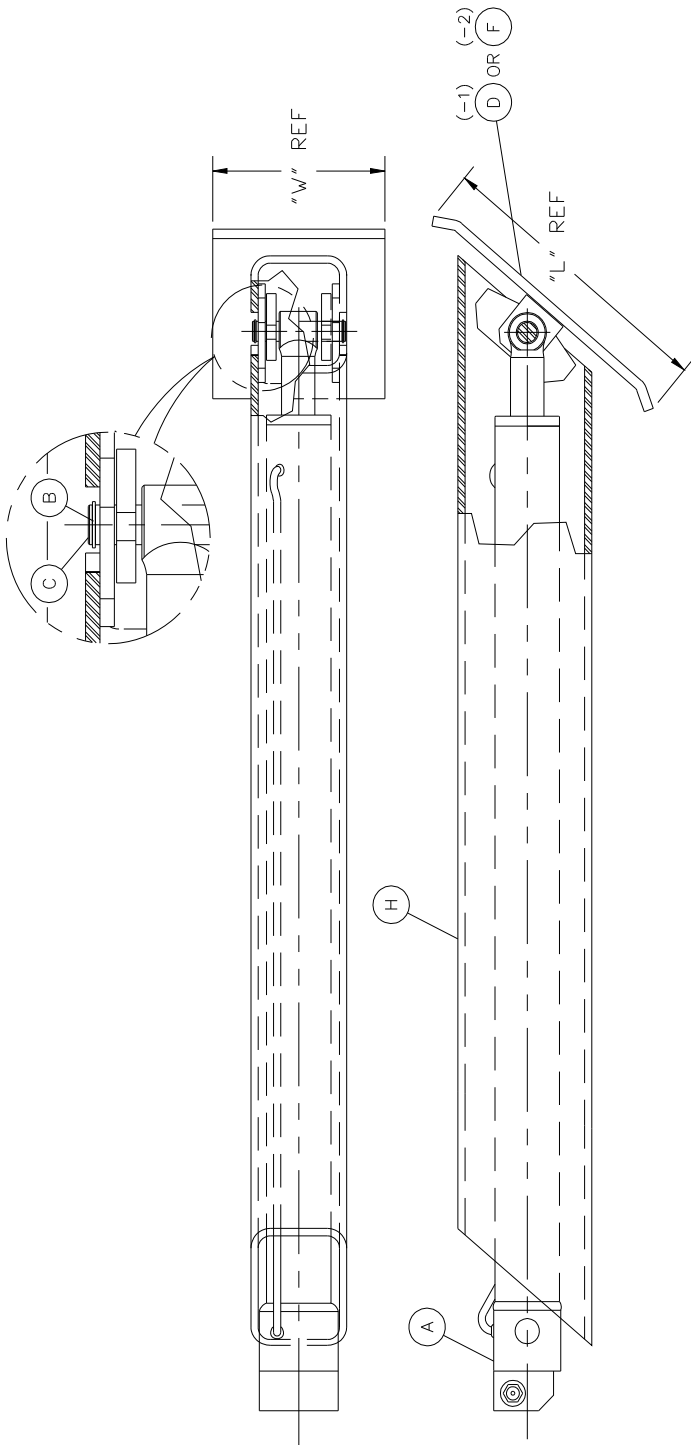
VERSALIFT

130-3

VERSALIFT


PARTS AND ASSEMBLIES

OUTRIGGER ASSEMBLY



DASH NO.		FOOT SIZE (L x W)	
-1		15 x 9	
-2		13 x 7	

QTY.	QTY.	ITEM	PART NO.	DESCRIPTION
1	1	H	14284-2	INNER LEG WELDMENT
1	1	G	14285-DWG	INNER LEG ASSY W/ P.F. DRAWING
1	-	F	8267-4	PIVOT FOOT WELDMENT (NARROW)
-	-	E	----	-
-	1	D	8267-1	PIVOT FOOT WELDMENT
1	1	C	5487-3	CYLINDER PIN
2	2	B	48000-12	RETAINING RING
1	1	A	12213-1	CYLINDER ASSEMBLY



MANUFACTURING  
COMPANY  
WACO TEXAS

UNLESS OTHERWISE NOTED:  
DIMENSIONS ARE IN INCHES  
DECIMALS: 1/16 .xx ± .03  
FRACTIONS: 1/8 .xxx ± .005  
ANGLES: .xxx ± .005  
MACHINED SURFACE FINISHES: 125  
PROJECTION OF VIEWS: ①  
ALL DIMENSIONS ARE IN INCHES  
THIS PRINT CONTAINS CONFIDENTIAL  
INFORMATION AND IS NOT  
TO BE DISCLOSED, COPIED, OR  
REPRODUCED WITHOUT EXPRESSED  
PERMISSION OF TIME MANUFACTURING.

LIST OF MATERIAL

DWN.	BY	DATE	TITLE
DF		11/06/94	INNER LEG ASSEMBLY WITH PIVOT FOOT
SIZE	A	1/9	MANUAL
LOCATION	V	-	-
SHEET	1	OF 1	DWG. NO. 14285-DWG

## SECTION 131

### OUTRIGGER PIN OPTION (OPTION OR-1400-9)

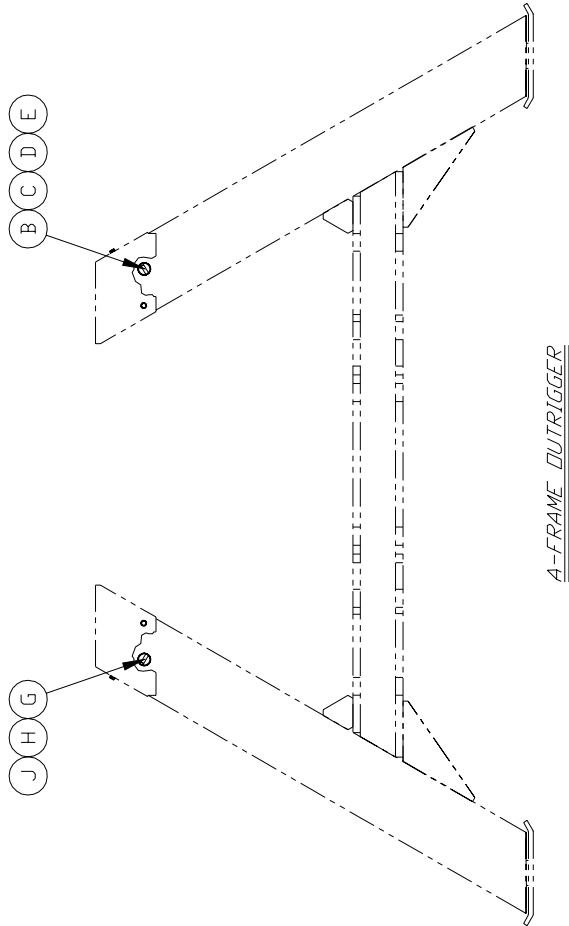
When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.

OUTRIGGER PIN OPTION

PARTS AND ASSEMBLIES

# OUTRIGGER PIN OPTION

REV. 1



A-FRAME OUTRIGGER

\* = ITEMS TO BE SHIPPED LOOSE (-9 ONLY)

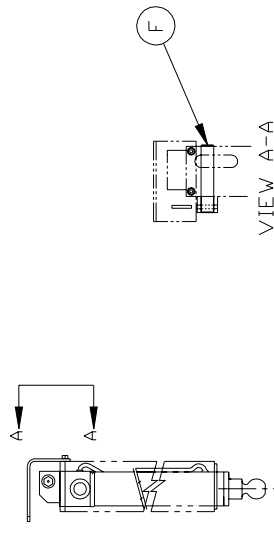
DASH #	DESCRIPTION	OPTION #
-1	OUTRIGGER PIN OPTION 5 IN. LG.	OR-1400-7
-2	OUTRIGGER PIN OPTION 5 IN. LG. W/ INTERLOCK	OR-1400-8
-3	OUTRIGGER PIN OPTION 8 IN. LG.	OR-1400-9
-4	OUTRIGGER PIN OPTION 8 IN. LG. W/ INTERLOCK	OR-1400-10
-5	OUTRIGGER PIN OPTION 6-3/4 IN. LG.	OR-1400-11
-6	OUTRIGGER PIN OPTION 6-3/4 IN. LG. W/ INTERLOCK	OR-1400-12
-7	OUTRIGGER PIN OPTION 8-1/2 IN. LG.	OR-1400-13
-8	OUTRIGGER PIN OPTION 8-1/2 IN. LG. W/ INTERLOCK	OR-1400-14
-9	OUTRIGGER PIN OPTION 8 IN. LG. W/ INTERLOCK UK SHIP LOOSE	OR-1400-26

QTY.	-9	-8	-7	-6	-5	-4	-3	-2	-1
		2	-	-	-	-	-	-	-
		-	2	-	-	-	-	-	-
		-	-	2	-	-	-	-	-
		-	-	-	2	-	-	-	-
	2	-	-	-	-	2	-	-	-
	-	-	-	-	-	-	2	-	-
	-	-	-	-	-	-	-	2	-
	-	-	-	-	-	-	-	-	2
	1	1	1	1	1	1	1	1	1

QTY.	ITEM	PART NO.	DESCRIPTION
	J	8763-2	PIN, OR CYL. 1 1/4 DIA. X 8 1/2 (INTERLOCK)
	H	8764-3	PIN, OR CYL. 1 1/4 DIA. X 8 1/2
	G	15269-1	PIN, OR CYL. 1 1/4 DIA. X 6 3/4 (INTERLOCK)
	F	15270-1	PIN, OR CYL. 1 1/4 DIA. X 6 3/4
	E	8763-1	PIN, OR CYL. 1 1/4 DIA. X 8 (INTERLOCK)
	D	8764-2	PIN, OR CYL. 1 1/4 DIA. X 8
	C	10102-1	PIN, OR CYL. 1 1/4 DIA. X 5 (INTERLOCK)
	B	10197-1	PIN, OR CYL. 1 1/4 DIA. X 5
	A	20080-DWG	DWG, OUTRIGGER PIN



H-FRAME OUTRIGGER

UNLESS OTHERWISE NOTED:  
TOLERANCES: DECIMALS  
FRACTIONS: 1/16, 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1 1/4, 1 1/2, 1 3/4, 2, 2 1/4, 2 1/2, 2 3/4, 3, 3 1/4, 3 1/2, 3 3/4, 4, 4 1/4, 4 1/2, 4 3/4, 5, 5 1/4, 5 1/2, 5 3/4, 6, 6 1/4, 6 1/2, 6 3/4, 7, 7 1/4, 7 1/2, 7 3/4, 8, 8 1/4, 8 1/2, 8 3/4, 9, 9 1/4, 9 1/2, 9 3/4, 10, 10 1/4, 10 1/2, 10 3/4, 11, 11 1/4, 11 1/2, 11 3/4, 12, 12 1/4, 12 1/2, 12 3/4, 13, 13 1/4, 13 1/2, 13 3/4, 14, 14 1/4, 14 1/2, 14 3/4, 15, 15 1/4, 15 1/2, 15 3/4, 16, 16 1/4, 16 1/2, 16 3/4, 17, 17 1/4, 17 1/2, 17 3/4, 18, 18 1/4, 18 1/2, 18 3/4, 19, 19 1/4, 19 1/2, 19 3/4, 20, 20 1/4, 20 1/2, 20 3/4, 21, 21 1/4, 21 1/2, 21 3/4, 22, 22 1/4, 22 1/2, 22 3/4, 23, 23 1/4, 23 1/2, 23 3/4, 24, 24 1/4, 24 1/2, 24 3/4, 25, 25 1/4, 25 1/2, 25 3/4, 26, 26 1/4, 26 1/2, 26 3/4, 27, 27 1/4, 27 1/2, 27 3/4, 28, 28 1/4, 28 1/2, 28 3/4, 29, 29 1/4, 29 1/2, 29 3/4, 30, 30 1/4, 30 1/2, 30 3/4, 31, 31 1/4, 31 1/2, 31 3/4, 32, 32 1/4, 32 1/2, 32 3/4, 33, 33 1/4, 33 1/2, 33 3/4, 34, 34 1/4, 34 1/2, 34 3/4, 35, 35 1/4, 35 1/2, 35 3/4, 36, 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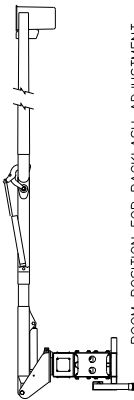
## SECTION 132

### CONTINUOUS ROTATION ASSEMBLY (OPTION RO-1330-2)

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.

# CONTINUOUS ROTATION

REV. 0



BOOM POSITION FOR BACKLASH ADJUSTMENT

## GEAR BACKLASH ADJUSTMENT NOTES:

- 1.) SET BACKLASH AFTER INSTALLATION OF BOOMS, ETC.
- 2.) INSTALL ROTATION BEARING SO THAT THE HIGH TOOTH IS ON THE CENTERLINE OF THE PEDESTAL EITHER TOWARDS THE REAR OR FRONT OF THE CHASSIS.
- 3.) LOOSEN FOUR BOLTS (ITEM R) LEAVING THEM LOOSE ENOUGH TO ALLOW THE FLAT WASHERS TO ROTATE, SO THAT THE GEARBOX IS LOCATED OVER THE HIGH POSITION OF THE TURRET. THE LOWER BOOM AND PLACE THE OUTER BOOM TO BE FULLY HORIZONTAL.
- 4.) POSITION THE TURRET, SO THAT THE GEARBOX IS LOCATED OVER THE HIGH POSITION OF THE TURRET. THE LOWER BOOM AND PLACE THE OUTER BOOM TO BE FULLY HORIZONTAL.
- 5.) REMOVE THE TWO SCREWS (ITEM Q) THROUGH THE ANCHOR TABS INTO THE ECCENTRIC RING (ITEM F).
- 6.) ROTATE THE ECCENTRIC RING IN THE DIRECTION INDICATED BY THE ARROW ON THE TOP VIEW OF TURRET. THIS ROTATION WILL CAUSE THE GEARBOX TO KICK UP SLIGHTLY ONCE THE PINION GEAR FULLY ENGAGES THE ROTATION BEARING.
- 7.) ROTATE THE ECCENTRIC RING IN THE OPPOSITE DIRECTION UNTIL TWO HOLES IN THE ECCENTRIC RING ALIGN WITH ONE HOLE IN EACH ANCHOR TAB AND MARK THESE HOLE LOCATIONS. NOTE THAT ONLY TWO HOLES ON THE ECCENTRIC RING WILL ALIGN AT ONE TIME WITH DIFFERENT HOLES IN THE ANCHOR TABS. CONTINUE TO ROTATE THE ECCENTRIC RING IN THIS DIRECTION FOR APPROXIMATELY A 1/8 TURN OF THE RING AND THEN ROTATE THE RING BACK TO THE MARKED SET OF HOLES AND INSTALL THE TWO SCREWS (ITEM Q) REMOVED EARLIER.
- 8.) RETIGHTEN THE BOLTS (ITEM R) WHICH HOLD THE GEARBOX IN POSITION.
- 9.) START THE UNIT, AND FROM THE LOWER CONTROLS, ROTATE THE LIFT SO THAT THE PINION IS POSITIONED 2-3 IN. FROM THE HIGH TOOTH OF THE ROTATION BEARING.
- 10.) PLACE A PLASTIC SHIM (ITEM AG) AT THE HIGH TOOTH POSITION ON THE ROTATION BEARING AND CAREFULLY ROTATE THE LIFT SO THAT THE PINION ROTATES COMPLETELY OVER THE SHIM.
- 11.) REMOVE THE SHIM. IF THE MINIMUM BACKLASH IS SET PROPERLY, THE PINION SHOULD NOT CUT THIS SHIM INTO PIECES. IF IT DOES, LOOSEN THE GEARBOX BOLTS AND REPEAT STEPS 7 THROUGH 10. ALIGN AND TIGHTEN EVERYTHING AND RECHECK THE BACKLASH AGAIN WITH ANOTHER SHIM. REPEAT AS OFTEN AS NECESSARY UNTIL THE PROPER CLEARANCE IS ACHIEVED.

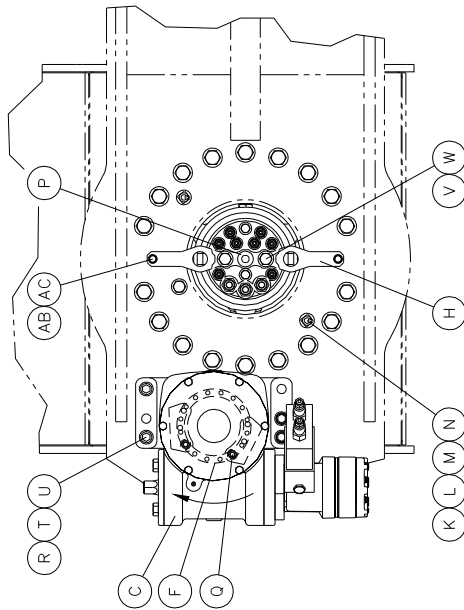
REMEMBER THAT THERE MUST ALWAYS BE A SLIGHT AMOUNT OF CLEARANCE BETWEEN THESE GEARS. DO NOT CONCEIVE LOOSENESS OR WEAR IN THE GEARBOX WITH THE DESIRED CLEARANCE BETWEEN THE GEAR AND PINION.

## LUBRICATION NOTES:

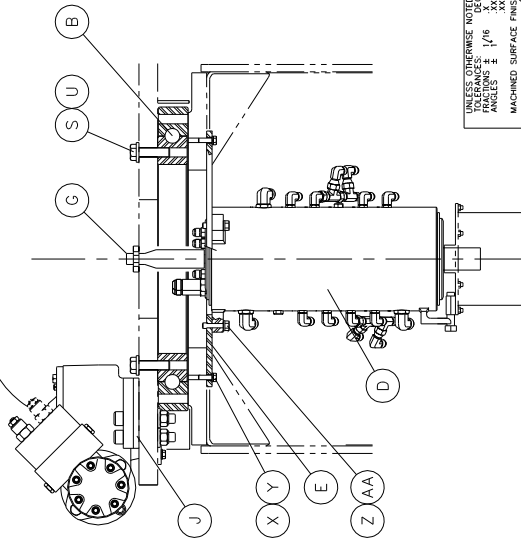
- 1.) LUBRICATE THE ROTATION GEAR TEETH WITH GEAR SHIELD GREASE (ITEM AE).
- 2.) LUBRICATE THE ROTATION BEARING THROUGH ZERK (ITEM N) WITH RONE X GREASE (ITEM AD).
- 3.) APPLY ANTI-SIEZE (ITEM AH) TO THE INSIDE AND OUTSIDE DIAMETERS OF THE ECCENTRIC RING (ITEM F) BEFORE INSTALLATION.

## INSTALLATION NOTES:

- 1.) TORQUE ROTATION BEARING BOLTS (ITEM S) PER TMC 778 AND MARK WITH TORQUE SEAL (ITEM AF)
- 2.) TORQUE GEAR BOX BOLTS (ITEM R) PER TMC 778 AND MARK WITH TORQUE SEAL (ITEM AF), AFTER BACKLASH ADJUSTMENT.



BOLT WILL BOTTOM OUT IN ROTARY JOINT, DRIVE STRAP TO BE FREE TO FLOAT



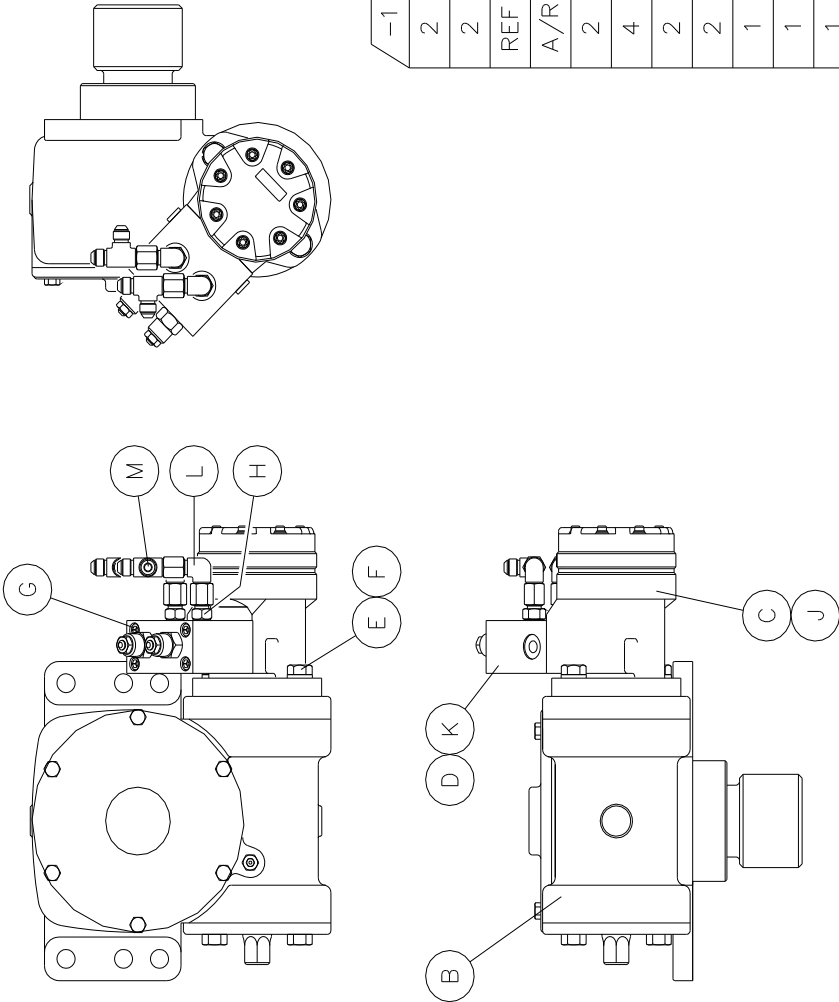
\* INDICATES PARTS TO BE SHIPPED LOOSE.

-1		ANTI-SEIZE	
A/R	AH	05-030	PLASTIC SHIM
1	AG	12739-1	TORQUE SEAL
A/R	AF	84006-2	GEAR SHIELD GREASE
A/R	AE	05-003	RONE X GREASE
A/R	AD	05-118	5/16NC X 1 LG. HHCS
2	AC	40003-5	5/16 LOCKWASHER
2	AB	44000-10	3/8-NC X 1 1/2 LG HHCS
3	AA	40004-7	3/8 LOCKWASHER
3	Z	44000-11	5/16NC X 1 LG. HHCS
4	Y	40003-5	5/16 LOCKWASHER
4	X	44000-10	1/2 HARDENED WASHER
2	W	44013-3	1/2-NC X 2 LG HHCS
2	V	40006-9	5/8 HARDENED WASHER
22	U	44013-1	5/8-NC LOCKNUT (GR.C)
4	T	42027-7	5/8-NC X 2 1/4 LG HHCS (GR.8)
18	S	40054-10	5/8-NC X 3 1/2 SHCS (GR.8)
4	R	40077-15	5/16-NC X 3/4 THWS
2	Q	40076-12	1/2" GROMMET
1	P	80000-1	ZERK
2	N	80008-10	1/8 NPT COUPLING
2	M	50113-1	1/8 NPT NIPPLE 2" LG.
2	L	50000-3	1/8 NPT 90° ELBOW
2	K	50012-1	GEAR BOX SPACER
2	J	12478-1	DRIVE STRAP BRACE
1	H	12518-1	DRIVE STRAP WELDMENT
1	G	12519-1	ECCENTRIC RING
1	F	8181-1	ROTARY JOINT MOUNTING PLATE
1	E	15035-1	SUB-ASSY ROTARY JOINT 13 PASS
1	D	33880-1	ROTATION GEARBOX SUB ASSEMBLY
1	C	32763-1	ROTATION BEARING
1	B	72020-1	CONT ROT ASSY - ELEVATOR
1	A	33881-DWG	DESCRIPTION

TIME		LIST OF MATERIAL	
TOLERANCES: DECIMALS		MANUFACTURING COMPANY	
ANGLES: 1/16		WACO TEXAS	
MACHINED SURFACE FINISHES: XX ± .003		SCALE	
PROJECTION OF VIEWS: 1st ANGLE		B 1=8	
ALL DIMENSIONS ARE IN INCHES		EST WT #	
INFORMATION AND ITS SOLID PROPERTY		MANUAL	
TO BE USED, LOANED, COPIED, OR NOT		SEE LIST OF MATERIAL	
PERMISSION OF TIME MANUFACTURING.		FINISH	
---		1 OF 1	
---		33881-DWG	



REV.	



APPLY ANTI-SEIZE TO MOTOR  
SHAFT BEFORE INSTALLING.

-1

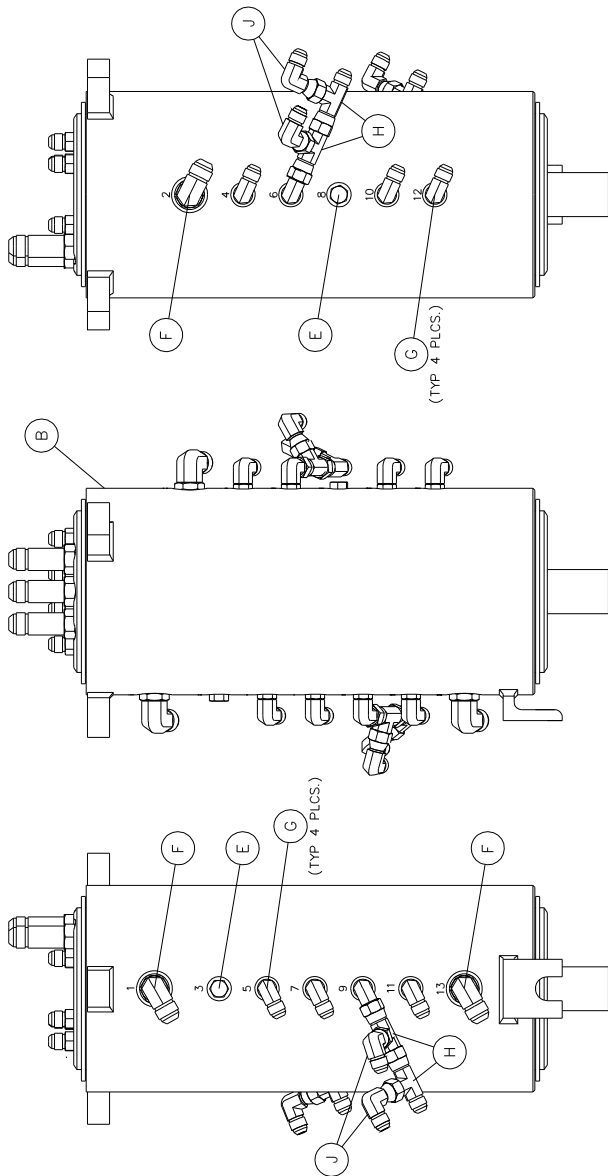
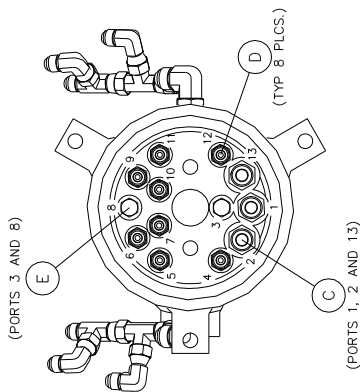
QTY.	ITEM	PART NO.	DESCRIPTION
2	M	50048-2	3/8 JIC S.N. RUN TEE
2	L	50004-3	3/8 JIC S.N. 90° ELBOW
REF	K	58021-112	O-RING
A/R	J	05-030	ANTI-SEIZE LUBRICANT
2	H	50009-3	#6 O-RING TO 3/8 JIC STR CONN
4	G	40033-13	5/16-18NC X 3 LG SHCS
2	F	44000-13	1/2 LOCKWASHER
2	E	40006-7	1/2-13NC X 1 1/2 LG. HHCS GR.5
1	D	12593-1	DUAL COUNTERBALANCE VALVE
1	C	56000-3	HYDRAULIC MOTOR
1	B	73012-1	ROTATION GEARBOX
1	A	32763-DWG	ROTATION GEARBOX ASSEMBLY

LIST OF MATERIAL			
UNLESS OTHERWISE NOTED: DIMENSIONS ARE IN INCHES FRACTIONS ± 1/16 ANGLES ± .03 MACHINED SURFACE FINISHES = 125 PROJECTION OF VIEWS = 1/4		MANUFACTURING COMPANY WACO TEXAS	
THIS PRINT CONTAINS CONFIDENTIAL INFORMATION AND IS THE PROPERTY OF TIME MANUFACTURING. IT IS NOT TO BE DISCLOSED, COPIED, OR REPRODUCED WITHOUT EXPRESSED PERMISSION OF TIME MANUFACTURING.		TIME	
MATERIAL SEE LIST OF MATERIAL		ROTATION GEARBOX SUB-ASSEMBLY	
FINISH ---		DWG. NO. 32763-DWG	

PARTS AND ASSEMBLIES

CONTINUOUS ROTATION


**CONTINUOUS ROTATION**




ROTARY JOINT FUNCTION CHART	
PORT	FUNCTION
1	PRESSURE TO UPPER CONTROLS
2	RETURN FROM UPPER CONTROLS
3	—
4	LWR BM RAISE
5	ROT CCW
6	ELEVATOR LOWER
7	UPPER BM FOLD
8	—
9	ELEVATOR RAISE
10	UPPER BM UNFOLD
11	ROT CW
12	LWR BM LOWER
13	RETURN FROM UPPER CONTROLS

-1		QTY.	ITEM	PART NO.	DESCRIPTION	LIST OF MATERIAL
4	J	50004-3	#6 JIC S.N. 90° ELBOW			
4	H	50048-2	#6 JIC S.N. RUN TEE			
8	G	50011-25	#4 O-RING TO #6 JIC 90° ELBOW			
3	F	50011-4	#8 O-RING TO #8 JIC 90° ELBOW			
4	E	50081-1	#4 O-RING HEX PLUG			
8	D	50009-20	#4 O-RING TO #6 JIC STR ADPT			
3	C	50046-2	#8 O-RING TO #8 JIC LG STR ADPT			
1	B	12524-1	ROTARY JOINT 13 PASS			
1	A	33680-DWG	SUB-ASSY ROTARY JOINT 13 PASS			

UNLESS OTHERWISE NOTED:  
TOLERANCES: DECIMALS  
FRACTIONS: ± 1/16  
ANGLES: ± .xx ± .03  
                  .xxx ± .005

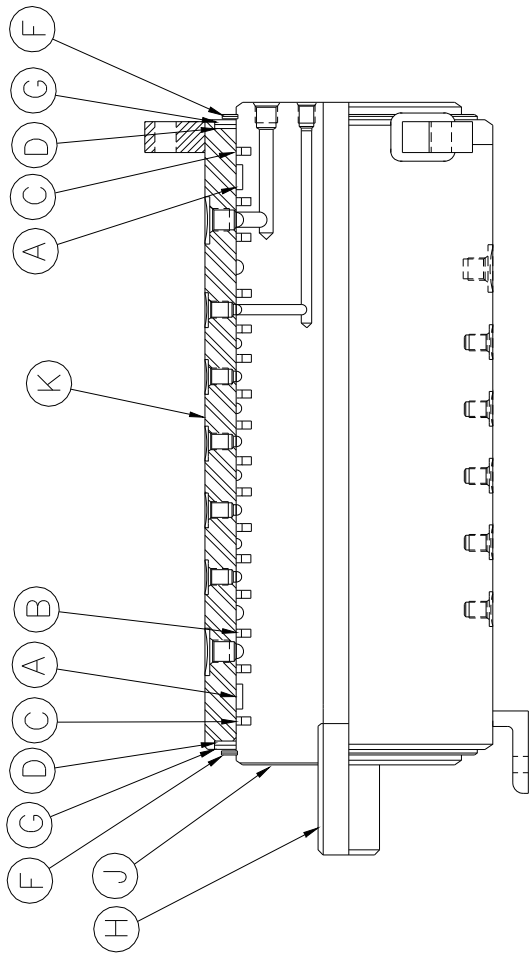
MACHINED SURFACE FINISHES = 125  
PROJECTION OF VIEWS   
ALL DIMENSIONS ARE IN INCHES

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PERMISSION OF TIME MANUFACTURING.

 <b>McQuay-Norris</b>	<b>MANUFACTURING COMPANY</b> <b>WACO TEXAS</b>	<b>DATE</b> 7-28-08		<b>FILE</b> SUB ASSEMBLY ROTARY JOINT 13 PASS
		<b>SIZE</b> 4 <b>SCALE</b> 4	<b>EST WT</b> # <b>MANUAL</b>	
<b>SEE LIST OF MATERIAL</b>		<b>SHEET</b> 1	<b>DWG. NO.</b> 33880-DWG	<b>1 OF 1</b>



REV. 1



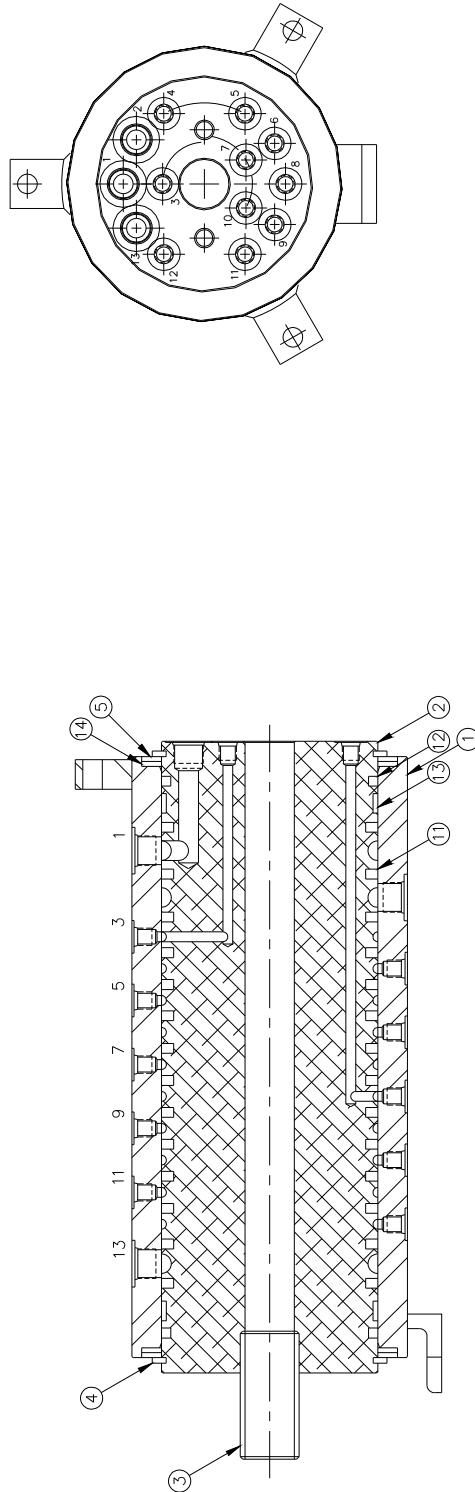
SERVICE PARTS			
ITEM	PART DESCRIPTION	TIME PART NO	QTY
* A	WEAR RING	N.P.S	2
* B	ROTARY GLYD RING SET	N.P.S	14
* C	DC GLYD RING	N.P.S	2
* D	WEAR RING	N.P.S	2
E	SEAL KIT	X527-516	1
F	RETAINING RING	X527-521	2
G	STEEL RING	X524-522	2
H	ROD STUB	X527-523	1
J	SWIVEL SPOOL	X527-524	1
K	TUBE ASS'Y	X527-525	1

\* THESE ITEMS ARE IN THE SEAL KIT, BUT NOT PURCHASED SEPARATELY.

	MANUFACTURING		DATE		TITLE	
	COMPANY		JBS		8/17/93	
	WACO TEXAS		SIZE		SCALE	
			B		N/A	
MATERIAL		EST WT #		MANUAL		ROTARY JOINT (13-PASS)
FINISH		SHEET		2 OF 4		DWG. NO. 12524-1

PARTS AND ASSEMBLIES


CONTINUOUS ROTATION



SERVICE PARTS			
ITEM	PART DESCRIPTION	PART NO	QTY
1	TUBE ASSEMBLY	Y3232	1
2	HUB	Y3231	1
3	TUBE	Y3228	1
4	RETAINING RING	Y3229	2
5	WASHER	Y3230	2
11	SEAL KIT	Y3233	1
12	ROTARY GLYD RING	NSS	14
13	DC GLYD RING	NSS	2
14	WEAR RING	NSS	2
14	BEARING	NSS	2

\* THESE ITEMS ARE IN THE SEAL KIT  
BUT NOT PURCHASED SEPARATELY.

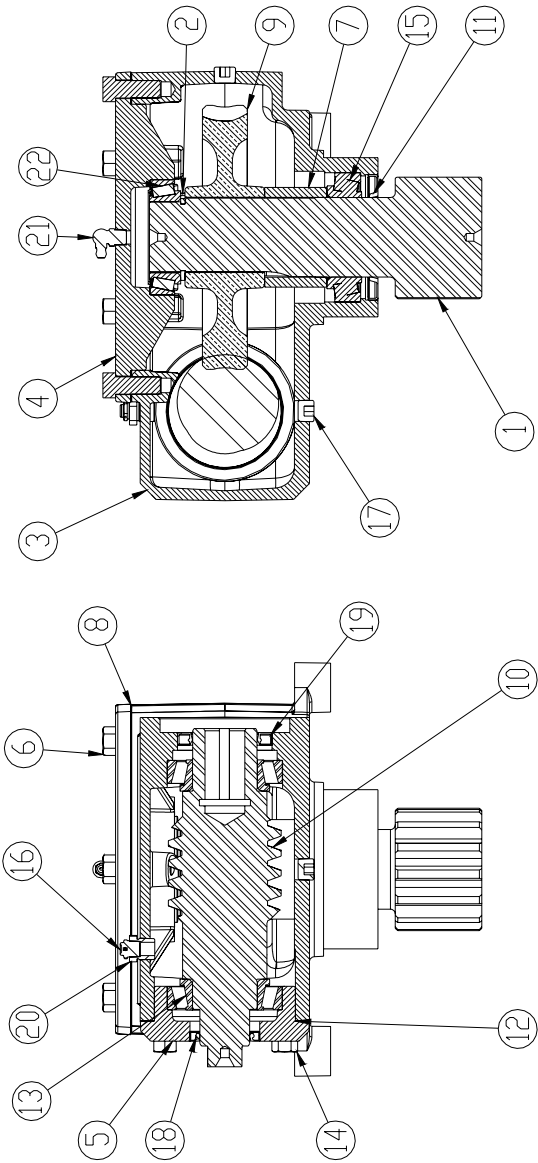
APPROVED VENDOR: TMS  
VENDOR PART NUMBER: RJ-00042

<div>UNLESS OTHERWISE NOTED: DIMENSIONS ARE IN INCHES FRACTIONS ± 1/16 DECIMALS ± .005 ANGLES ± 1° MACHINED SURFACE FINISHES XX ± .005 ALL DIMENSIONS ARE IN INCHES INFORMATION IS FOR IDENTIFICATION ONLY. IT IS NOT TO BE USED FOR REPRODUCTION OF THE MANUFACTURING PROCESS OR THE MANUFACTURING PROCESS.</div>	<div> <b>TIME</b> MANUFACTURING COMPANY WACO TEXAS</div>	DRAWN BY	DATE	TITLE
		JBS	8/17/93	ROTARY JOINT
		SIZE	N/A	(13-PASS)
		EST WT #	MANUAL	4 OF 4
		SHEET		DWC NO. 12524-1

GEARBOX



SERVICE PARTS			
ITEM	PART DESCRIPTION	TIME PART NO.	QTY.
1	OUTPUT PINION	Y2967	1
2	SNAP RING, INT SHRT75STPA	Y2687	1
3	HOUSING	Y2963	1
4	CAP. GEAR	Y2689	1
5	CAP. WDRM	Y2690	1
6	7/16-14 X 1 1/8 HHCS	Y2693	6
7	SPACER GEAR	Y2964	1
8	SHIM, GEAR .010 BROWN	Y2696	AS REQ
8	SHIM, GEAR .0075 NATURAL	Y2697	AS REQ
8	SHIM, GEAR .005 BLUE	Y2698	AS REQ
8	SHIM, GEAR .003 GREEN	Y2699	AS REQ
9	GEAR, WDRM 39:1	Y2965	1
10	WDRM 39:1	Y2701	1
11	OIL SEAL, C/R 20078	Y2704	1
12	SHIM, WDRM .0075 NATURAL	Y2706	AS REQ
12	SHIM, WDRM .005 BLUE	Y2707	AS REQ
12	SHIM, WDRM .003 GREEN	Y2708	AS REQ
13	BRG, ROLLER CUP NP761714 & CONE NP535811	Y2719	2
14	3/8-16 x 1 1/8 HHCS	Y2966	4
15	BRG, ROLLER CUP-LM104911 & CONE-LM104949	Y2711	1
16	VENT. PRESSURE 1-5 PSIG	Y2712	1
17	1/4-18 NPTF HEX PLUG	Y2713	2
18	OIL SEAL, C/R 12364	Y2714	1
19	OIL SEAL, C/R 16084	Y2715	1
20	BUSHING, RED 1/8 X 1/4	Y2716	1
21	GREASE FITTING #1613-B	Y2717	1
22	BRG, ROLLER CUP-LM102910 & CONE-LM102949	Y2718	1



PERFECTION GEARBOX  
-2 CONFIGURATION

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN INCHES.		TOLERANCES FRACTIONS ± 1/16 DECIMALS ± .005		MACHINED SURFACE FINISHES—Rz .XXX ± .005		ALL DIMENSIONS ARE IN INCHES.	
THIS PRINT CONTAINS CONFIDENTIAL INFORMATION OF TIME MANUFACTURING, AND IS NOT TO BE REPRODUCED WITHOUT EXPRESS PERMISSION OF TIME MANUFACTURING.		DRAWING NO. 73020-2		SHEET 4 OF 4		DATE 08/17/04	
REV		DATE		TITLE		GEARBOX ASSEMBLY	
REWORK		08/17/04		SCALE		B 1/2	
EST		WT		MANUAL		SEE ABOVE	
FINISH		SEE NOTE 3		MATERIAL		WACO TEXAS	
MANUFACTURING COMPANY		WACO TEXAS		TIME		GEARBOX ASSEMBLY	

PARTS AND ASSEMBLIES

GEARBOX



## SECTION 133

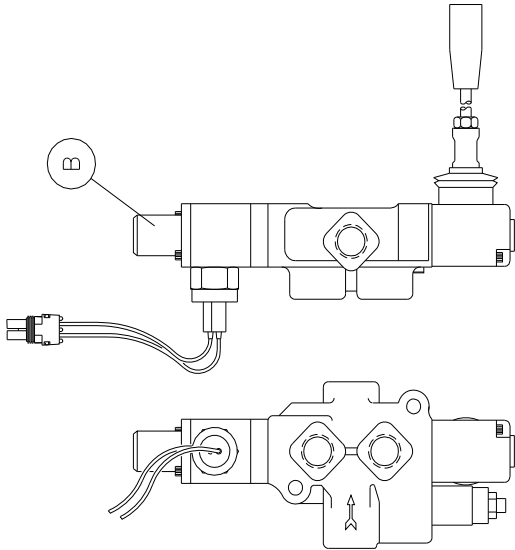
### ONE OUTRIGGER VALVE W/ RELIEF & SWITCH (OPTION VK-1400-21)

When ordering replacement parts, confirm the actual part number with the 'As Built Material List' located in the back of this manual. This list is arranged by option code to provide an easy method to locate part numbers.



VALVE KITS

REV	



DASH NO.	DESCRIPTION	OPTION
-1	ONE OUTRIGGER VALVE WITH RELIEF AND SWITCH	VK-1400-21

NOTE:  
1.) CONTROL VALVES TO BE MOUNTED IN A LOCATION WHERE OUTRIGGERS CAN BE SEEN DURING OPERATION.

\* = ITEMS TO BE SHIPPED LOOSE

SINGLE OUTRIGGER CONTROL VALVE ASSEMBLY  
WITH OUTRIGGER WARNING SWITCH

-1					
1		B	54022-15	CONTROL VALVE W/HANDLE & SWITCH	
1		A	20620-DWG	DWG, O/R CONTROL VALVE W/RELIEF	
QTY.	ITEM	PART NO.	DESCRIPTION		
LIST OF MATERIAL					

UNLESS OTHERWISE NOTED: TOLERANCES: FRACTIONS ± 1/16 DECIMALS X ± .03 XX ± .01 XXX ± .005 MACHINED SURFACE FINISHES = 125/ PROJECTION OF VIEWS ALL DIMENSIONS ARE IN INCHES THIS PRINT CONTAINS CONFIDENTIAL INFORMATION AND IS SOLE PROPERTY OF VERSALIFT COMPANY. IT IS NOT TO BE DISCLOSED, COPIED, OR REPRODUCED WITHOUT EXPRESSED PERMISSION OF TIME MANUFACTURING.		MANUFACTURING COMPANY WACO TEXAS		DWN. BY REW	DATE 01/21/11	TITLE OUTRIGGER CNTRL VALVE KIT WITH RELIEF
SEE ABOVE		MATERIAL		EST WT #	MANUAL	
FINISH		1 OF 1		SHEET	DWG. NO.	20620-DWG

## AS BUILT OPTIONS AND PARTS INDEX

This “As Built Options and Parts Index” includes a list of the components used in the production of this unit.

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## As Built Option List

<u>Option</u>	<u>Description</u>	<u>Qty</u>
<b><u>Assemblies:</u></b>		
VO270EREV	VO270EREV Base Bill	1.00
SD-1200-22	Blue Boot for Air Cylinder	1.00
CA-853	Decal Platform Capacity 350LB 160KG	1.00
DE-1330-24	Decal Placement (Asplundh) VO270E	1.00
DE-1400-4	Outrigger Control Decals single valve and single valve with interlock	1.00
DE-1330-18	HR Decal Kit Upper Cntrls S-Stick Btwn BM and BKT	1.00
	VO265E/260EREV-02	
EP-1340-1	Emergency Power Insulated 12VDC	1.00
CC-1330-5	Prep Kit - Air Operated Platform Controls	1.00
HK-1330-17	Boom Hose Kit VO270EREV	1.00
HYD-1330-11	Lower Control Panel (Asplundh) VO270E	1.00
HYD-1330-5	Cylinders	1.00
KN-1330-1	Knuckle Linkage Assy Reverse	1.00
LB-1330-1	Lower Boom Assembly	1.00
HYD-1330-6	Valve Kit Lower Controls	1.00
LO-1330-2	Leveling system VO-260Rev-02	1.00
MH-1330-9	Lower Boom Rest Sled Only (11" Tall)	1.00
MH-812	Upper Boom Rest VO250/255I	1.00
RE-DELETE	PC Config Placeholder	1.00
PS-1330-12	Asplundh Pltfrm Supt S-Stick Btwn Bm and Bkt with Pltfrm Tilt Rev Mt	1.00
SC-1330-37	Asplundh HR S-Stick Cntrls Rev Mt Btwn Bm and Bskt w/Reg Tool	1.00
	Press/Flow for Tilting Platform	
SD-1200-13	Slope Indicators (with Outriggers) English	1.00
SK-34	Shipping Skid VO255RV	1.00
SS-DELETE	SS Config Placeholder	1.00
UB-1330-2	Upper Boom VO260REV-01/02	1.00
TT-1330-1	Turret Assembly	1.00
COLORCODE	Special Color Urethane / DUPONT L2958 TANGIER ORANGE	1.00
<b><u>Materials:</u></b>		
22085-00	EMI Safety Manual	1.00
28093-01	Manual of Responsibility MRA92.2-2009	1.00
28457-1	Collector Ring Assembly 1 Pass	1.00
39024-02	VO-265/270E Operators Manual	2.00
39025-02	VO265/270E Custom Service Manual	2.00
E-1330-3	Longitudinal Elev Assy (Asplundh)	1.00
FB-60	39 Fiberglass Bucket SHV32/36 SS	1.00
HK-1330-18	Elevator Hose Kit	1.00
MH-1330-10	Elevator Mounting Hardware VO270EREV (Asplundh)	1.00
OR-1400-49	Outrigger Assy Pivot Foot (Less Outer Housing Weld)	1.00
	VO265E/270EREV-01	
OR-1400-9	Outrigger Pin Option	1.00
RO-1330-2	Continuous Rotation Assembly	1.00
SK-1330-4	Shipping Skid Elevator (Asplundh) VO270EREV	1.00
VK-1400-21	One Outrigger Valve with Relief and Switch	1.00
33996-DWG	VO265E/270E Base Bill	1.00
PAINT	STD Versalift White Paint	4.00
PRIMER-PAINT	PRIMER PAINT	3.00

AS BUILT OPTIONS & PARTS INDEX

## As Built Material List

<u>Option</u>	<u>Part</u>	<u>Description</u>	<u>Qty</u>
CA-853	14015-1	Decal Platform Capacity	1.00
CC-1330-5	20578-DWG	Prep Kit for Platform Controls	1.00
CC-1330-5	40002-7	1/4-NC Hex Head Cap Screws 1 1/2"	2.00
CC-1330-5	42005-1	NC Hex Locknut 1/4	2.00
CC-1330-5	44013-7	Hardened Washer 1/4	4.00
CC-1330-5	58036-1	1/8 Airline Bundle	70.00
CC-1330-5	61025-1	14/5 Electrical Wire	25.00
CC-1330-5	6556-3	Pressure Switch Bracket (Batchweld) (Zinc Plated)	1.00
CFG-VO255-270	22085-00	EMI Safety Manual	1.00
CFG-VO255-270	28093-01	Manual of Responsibility MRA92.2-2009	1.00
CFG-VO255-270	28457-1	Collector Ring Assembly 1 Pass	1.00
CFG-VO255-270	39024-02	VO-265/270E Operators Manual	2.00
CFG-VO255-270	39025-02	VO265/270E Custom Service Manual	2.00
CFG-VO255-270	E-1330-3	Longitudinal Elev Assy (Asplundh)	1.00
CFG-VO255-270	FB-60	39 Fiberglass Bucket SHV32/36 SS	1.00
CFG-VO255-270	HK-1330-18	Elevator Hose Kit	1.00
CFG-VO255-270	MH-1330-10	Elevator Mounting Hardware VO270EREV (Asplundh)	1.00
CFG-VO255-270	OR-1400-49	Outrigger Assy Pivot Foot (Less Outer Housing Weld) VO265E/270EREV-01	1.00
CFG-VO255-270	OR-1400-9	Outrigger Pin Option	1.00
CFG-VO255-270	RO-1330-2	Continuous Rotation Assembly	1.00
CFG-VO255-270	SK-1330-4	Shipping Skid Elevator (Asplundh) VO270EREV	1.00
CFG-VO255-270	VK-1400-21	One Outrigger Valve with Relief and Switch	1.00
DE-1330-18	12340-1	Decal Conductive Hoses	1.00
DE-1330-18	13366-1	Decal Tool Pressure	1.00
DE-1330-18	26855-1	Decal Tool Selector	1.00
DE-1330-18	33877-1	Decal Elevator	1.00
DE-1330-18	33988-DWG	Decal Kit Up Cntrls Btwn Bm and Bkt VO255/260-02, VO265/270E	1.00
DE-1330-18	34259-1	Decal Single Stick HR Ctrl (Left Hand)	1.00
DE-1330-18	35500-1	Decal Upper Control Not Insulated	1.00
DE-1330-18	35537-1	Decal Test Point	1.00
DE-1330-18	8285-1	Decal Emergency Stop	1.00
DE-1330-24	11099-1	Data Plate Backing	1.00
DE-1330-24	12337-1	Decal Responsibilities	1.00
DE-1330-24	14014-1	Decal Platform Instruction	1.00
DE-1330-24	14110-1	Decal Electrocution Hazard	1.00
DE-1330-24	15732-1	Decal Emergency Lowering	4.00
DE-1330-24	27648-1	Decal Pinch Warning	1.00
DE-1330-24	30593-1	Decal Lanyard Attachment	1.00
DE-1330-24	34004-2	Decal Lower Control	2.00
DE-1330-24	34005-1	Decal Pinch Point	7.00
DE-1330-24	35878-DWG	Decal Placement (Asplundh)	1.00
DE-1330-24	35878-DWG	Decal Placement (Asplundh)	1.00
DE-1330-24	426-011	Versalift Nameplate	1.00
DE-1330-24	4541-1	Decal Versalift	1.00
DE-1330-24	4541-2	Decal Versalift	2.00
DE-1330-24	4542-12	Decal Danger Qualified Operator	1.00
DE-1330-24	4542-12	Decal Danger Qualified Operator	1.00
DE-1330-24	4542-2	Danger Electro Decal	4.00
DE-1330-24	4542-4	Decal Danger	1.00
DE-1330-24	4542-4	Decal Danger	1.00

AS BUILT OPTIONS & PARTS INDEX

## As Built Material List

<u>Option</u>	<u>Part</u>	<u>Description</u>	<u>Qty</u>
DE-1330-24	4542-5	Decal Caution	1.00
DE-1330-24	4542-5	Decal Caution	1.00
DE-1330-24	5098-1	Decal-Insulated Section	16.00
DE-1330-24	7500-1	Decal Holding Valve	4.00
DE-1330-24	7584-1	Decal Relief Adjustment	1.00
DE-1330-24	8928-1	Data Plate	1.00
DE-1400-4	12341-1	Decal Outrigger Operation	2.00
DE-1400-4	20088-DWG	Outrigger Control Decals	1.00
DE-1400-4	4992-1	Decal Caution Outriggers	2.00
DE-1400-4	8773-1	Decal Ground Control Selector	1.00
DE-1400-4	8845-1	Decal Outrigger Control	2.00
EP-1340-1	10274-1	Decal Emergency Power	1.00
EP-1340-1	10310-1	Decal Emergency Power	1.00
EP-1340-1	12596-1	Air Switch Boot	1.00
EP-1340-1	3051-2	Switch Guard	1.00
EP-1340-1	34174-1	Rubber Boot Air Cylinder	1.00
EP-1340-1	34823-DWG	Emergency Pwr Installation (Insulated)	1.00
EP-1340-1	34823-DWG	Emergency Pwr Installation (Insulated)	1.00
EP-1340-1	4383-1	Air Cylinder D-38606-A/1.06NSRS01.5	1.00
EP-1340-1	50065-1	90 Tubing Connector	1.00
EP-1340-1	50105-1	Tubing Connector	1.00
EP-1340-1	55007-1	Motor Pump 12 V DC	1.00
EP-1340-1	60002-3	One Pole Standard Toggle Switch	1.00
EP-1340-1	60015-1	Pressure Switch	1.00
EP-1340-1	61003-11-WHT	14GA Stranded Copper Wire (WHITE)	1.00
EP-1340-1	61007-1	4 AWG Type THW Battery Cable (600 Oil Resistant)	20.00
EP-1340-1	68046-1	Ring Terminal for Cable	4.00
EP-1340-1	68144-2	Fuse or Holder	1.00
EP-1340-1	68144-3	Fuse or Holder	1.00
EP-1340-1	68176-1	Terminal Insulator	1.00
EP-1340-1	80000-3	Knob	1.00
HK-1330-17	10286-24	1/4 Hose Assy w/3/8 Swvl Ends	2.00
HK-1330-17	10286-25	1/4 Hose Assy w/3/8 Swvl Ends	2.00
HK-1330-17	10286-7	1/4 Hose Assy with 3/8 Swivel Ends	2.00
HK-1330-17	33879-DWG	Boom Hose Kit VO265E/270E	1.00
HK-1330-17	3864-177	3/8 Hose Assembly (Non-Cond)	2.00
HK-1330-17	3864-18	3/8 Hose Assembly (Non-Cond)	2.00
HK-1330-17	3864-183	3/8 Hose Assembly (Non-Cond)	4.00
HK-1330-17	4532-107	1/2 HYD HOSE ASSY NON-COND	2.00
HK-1330-17	4532-119	1/2 Hydraulic Hose Assembly (Non-Cond)	1.00
HK-1330-17	50054-3	Bulkhead JIC Union	2.00
HK-1330-17	50056-3	Bulkhead Nut	2.00
HK-1330-17	50075-3	Branch Tee Female Swivel JIC	2.00
HK-1330-17	50077-3	JIC Tee	2.00
HK-1330-17	55679-4	5/16 NC Hose Assembly w/-3/8 Ends	2.00
HK-1330-17	6580-98	5/16 Hose Assy w/ 3/8 Ends Non Cond	2.00
HK-1330-17	89088-12	Hose Protective Cover (BPP)	2.00
HK-1330-17	89088-4	Hose Protective Cover	1.00
HK-1330-17	89088-6	Hose Protective Cover	1.00
HK-1330-17	89128-11	Hose Protective Cover	1.00
HK-1330-17	89164-6	Hose Protective Cover	1.00
HK-1330-17	89164-7	Hose Protective Cover	1.00
HYD-1330-11	28100-1	Valve Mount Plate	1.00

AS BUILT OPTIONS & PARTS INDEX

## As Built Material List

<u>Option</u>	<u>Part</u>	<u>Description</u>	<u>Qty</u>
HYD-1330-11	28102-1	Control Panel	1.00
HYD-1330-11	28104-1	Control Cover	1.00
HYD-1330-11	35877-DWG	Lower Control Panel Assembly	1.00
HYD-1330-11	40047-5	1/4 20 Hex Washer Head Taptite Screw	6.00
HYD-1330-11	89003-1	Vinyl Trim	1.00
HYD-1330-5	20574-DWG	Cylinder Assembly	1.00
HYD-1330-5	22210-1	Lower Cylinder Assy w/BRGS	1.00
	Lot No. 1134-100029377		
HYD-1330-5	22211-2	Upper Cylinder Assy w/BRGS VO250-260	1.00
	Lot No. 1134-100039258		
HYD-1330-6	10424-10	Handle Upper Control Valve	5.00
HYD-1330-6	33999-DWG	Valve Kit Lower Controls	1.00
HYD-1330-6	54135-2	Lower Control Valve (Open Center)	1.00
HYD-1330-6	7442-6	Spacer (Stainless Steel)	3.00
KN-1330-1	10226-14	Pivot Spacer	5.00
KN-1330-1	10226-15	Pivot Spacer	2.00
KN-1330-1	20576-DWG	Knuckle Linkage Assembly	1.00
KN-1330-1	22107-1	Upper Link	1.00
KN-1330-1	22107-2	Upper Link	1.00
KN-1330-1	22135-1	Washer Special (Zinc Plated)	2.00
KN-1330-1	22135-2	Washer Special (Zinc Plated)	1.00
KN-1330-1	22146-1	Pin Assembly 22145-1	3.00
KN-1330-1	22207-1	Lower Link Assy w/Brgs Rev Mount	1.00
KN-1330-1	40004-5	3/8 NC Hex Head Cap Screw	8.00
KN-1330-1	40006-21	1/2-13NC X 6" HHCS	3.00
KN-1330-1	42005-5	NC Hex Locknut 1/2	3.00
KN-1330-1	44013-3	Hardened Washer 1/2	3.00
KN-1330-1	44013-6	Hardened Washer 3/8	8.00
KN-1330-1	48014-87	5100 Retainer Rings	1.00
KN-1330-1	48048-325	RETAINING RING 3.006 FREE DIA	1.00
KN-1330-1	5531-1	Pin Washer (Zinc Plated)	3.00
KN-1330-1	8546-12	Pin Assembly 22185-1	1.00
LB-1330-1	20575-DWG	Lower Boom Assembly	1.00
LB-1330-1	22142-1	Cover Elbow	1.00
LB-1330-1	22184-1	Pin Assembly	1.00
LB-1330-1	29532-1	Hose Cover Elbow	1.00
LB-1330-1	29534-1	Cover Inspection (Plastic)	7.00
LB-1330-1	32754-1	Lwr Boom Assy VO255/260-01 RV	1.00
LB-1330-1	32767-2	Lower Boom Cover (Zinc Plated)	1.00
LB-1330-1	40004-5	3/8 NC Hex Head Cap Screw	2.00
LB-1330-1	40007-5	5/8 NC Hex Head Cap Screws	1.00
LB-1330-1	40076-12	5/16-18 Taptite Screw 3/4"	6.00
LB-1330-1	40076-8	5/16-18 Tapite Screw 1/2"	18.00
LB-1330-1	40109-7	3/8-16NC HHC (St Steel)	2.00
LB-1330-1	42003-3	Castle Nut 3/8"NF	2.00
LB-1330-1	44000-11	Helical Spring Lock Washers	2.00
LB-1330-1	44013-6	Hardened Washer 3/8	2.00
LB-1330-1	5531-2	Pin Washer (Zinc Plated)	1.00
LB-1330-1	8441-1	Bearing	2.00
LO-1330-2	10226-19	Pivot Spacer	2.00
LO-1330-2	14643-7	Roller Chain	2.00
LO-1330-2	14643-8	Extension Chain	1.00
LO-1330-2	14643-9	Extension Chain	1.00

## As Built Material List

<u>Option</u>	<u>Part</u>	<u>Description</u>	<u>Qty</u>
LO-1330-2	15375-13	Leveling Rod Assy (1/2 Dia Rods)	1.00
LO-1330-2	15375-21	Leveling Rod Assy (1/2 Dia Rods)	1.00
LO-1330-2	15375-23	Leveling Rod Assy (1/2 Dia Rods)	1.00
LO-1330-2	15375-25	Leveling Rod Assy (1/2 Dia Rods)	1.00
LO-1330-2	15614-1	Level Tension Eye Bolt (Zinc Plated)	2.00
LO-1330-2	15614-2	Level Tension Eye Bolt (Zinc Plated)	2.00
LO-1330-2	15622-4	Pin Idler	1.00
LO-1330-2	15689-1	Idler Sprocket w/BRGS	1.00
LO-1330-2	22201-1	Leveling Anchor (ZINC PLATED)	1.00
LO-1330-2	27833-1	Hose Divider (Zinc Plated)	1.00
LO-1330-2	32770-1	Sprocket Platform (Zinc Plated)	1.00
LO-1330-2	33922-1	Sprocket Batch Weld (Zinc Plated)	1.00
LO-1330-2	33925-1	Leveling Idler Batch Weld (Zinc Plated)	1.00
LO-1330-2	33928-DWG	Leveling System Assembly VO-255/260	1.00
LO-1330-2	40004-18	3/8 NC Hex Head Cap Screws	1.00
LO-1330-2	40007-9	5/8 NC Hex Head Cap Screws	1.00
LO-1330-2	40083-1	Button HD Hex Socket Capscrew	4.00
LO-1330-2	40083-10	Button HD Hex Socket Capscrew	2.00
LO-1330-2	42000-5	NC Hex Nuts	2.00
LO-1330-2	42000-7	NC Hex Nuts	2.00
LO-1330-2	42005-3	NC Hex Locknut 3/8	5.00
LO-1330-2	42005-5	NC Hex Locknut 1/2	2.00
LO-1330-2	42005-7	NC Hex Locknut 5/8	2.00
LO-1330-2	42041-5	NC Hex Nuts Left Hand	1.00
LO-1330-2	44013-1	Hardened Washer 5/8	2.00
LO-1330-2	44013-3	Hardened Washer 1/2	2.00
LO-1330-2	48063-1	Turnbuckle Barrel	2.00
LO-1330-2	70025-1	Connecting Link	10.00
LO-1330-2	8681-1	Lev Adjustment Rod (ZINC PL)	1.00
MH-1330-9	35865-1	Lower Boom Sled (Batchweld)	1.00
MH-1330-9	35866-DWG	Lower Boom Rest Installation	1.00
MH-1330-9	40005-7	7/16 NC Hex Head Cap Screws	4.00
MH-1330-9	42002-7	NC Hex Jam Nuts	2.00
MH-1330-9	42005-4	NC Hex Locknut 7/16	4.00
MH-1330-9	44013-9	Hardened Washer 7/16	8.00
MH-812	12865-1	Flat (Zinc Plated)	1.00
MH-812	22218-1	Boom Rest (Batch Weld)	1.00
MH-812	22249-1	Upper Boom Rest Installation	1.00
MH-812	22342-1	Boom Rest	1.00
MH-812	40006-9	1/2-NC Head Cap Screw	2.00
MH-812	4163-1	Pin Washer (Zinc Plated)	2.00
MH-812	42005-2	NC Hex Locknut 5/16	2.00
MH-812	42005-5	NC Hex Locknut 1/2	2.00
MH-812	42005-5	NC Hex Locknut 1/2	2.00
MH-812	8993-3	Boom Tie Down Strap Assy	1.00
PS-1330-12	11199-1	Cable Assembly	1.00
PS-1330-12	12848-3	Limit Strap	1.00
PS-1330-12	13344-1	Pivot Shaft (Zinc Plated)	1.00
PS-1330-12	13517-1	Polyethylene Bolt Cover	1.00
PS-1330-12	14076-1	Tilt Shaft Assembly (Zinc Plated) (Batch Weld)	1.00
PS-1330-12	14424-1	Shock Mount (Zinc Plated)	1.00
PS-1330-12	35714-DWG	Platform Support Assembly	1.00
PS-1330-12	35715-DWG	Platform Tilt Assembly	1.00
PS-1330-12	35716-1	Tilt Arm	2.00

AS BUILT OPTIONS & PARTS INDEX

## As Built Material List

<u>Option</u>	<u>Part</u>	<u>Description</u>	<u>Qty</u>
PS-1330-12	35717-1	Platform Support Panel (Batchweld)	1.00
PS-1330-12	35722-1	Cover Control Panel Rev Mt	1.00
PS-1330-12	35723-1	Cover Tool Power	2.00
PS-1330-12	35724-1	Cover Control Panel Lower Closure	1.00
PS-1330-12	35781-1	Pivot Rod (Zinc Plated)	1.00
PS-1330-12	40003-10	5/16 NC Hex Head Cap Screw	4.00
PS-1330-12	40171-10	3/8-NC Fiber Flanged HD Cap Screw	2.00
PS-1330-12	40171-16	3/8-NC Fiber Flanged HD Cap Screw	6.00
PS-1330-12	40171-24	3/8-NC Fiber Flanged HD Cap Screw	4.00
PS-1330-12	42005-2	NC Hex Locknut 5/16	4.00
PS-1330-12	42024-6	3/8-16NC Hex Nut	8.00
PS-1330-12	44002-8	Standard Flat Washer	4.00
PS-1330-12	44013-1	Hardened Washer 5/8	2.00
PS-1330-12	44013-2	Hardened Washer 1"	3.00
PS-1330-12	44013-5	Hardened Washer 5/16 (Plated)	5.00
PS-1330-12	45008-10	Roll Pin	2.00
PS-1330-12	45008-19	Roll Pin	2.00
PS-1330-12	45008-8	Roll Pin	2.00
PS-1330-12	45013-4	Lock Pin	1.00
PS-1330-12	72041-1	Flange Bearing (MACH 72011-6)	2.00
PS-1330-12	7442-10	Spacer (Stainless Steel)	4.00
PS-1330-12	80015-3	Shock Absorber	2.00
PS-1330-12	80042-1	Compression Spring (Zinc Plated)	1.00
PS-1330-12	89021-2	Grip .250-740-52-RE-R-1200 Red	1.00
SC-1330-37	12735-1	Spacer	7.00
SC-1330-37	13109-3	Selector Valve Handle 14-5/8"	1.00
SC-1330-37	14003-1	Base Plate Single Stick (LH)	1.00
SC-1330-37	28489-1	Saftey ArmTrigger (Zinc Plated)	1.00
SC-1330-37	33166-1	Handle Plastic Control	1.00
SC-1330-37	33174-1	3 Axis Control Handle Body	1.00
SC-1330-37	33177-1	Plastic Link	2.00
SC-1330-37	33401-1	Backing Plate (Zinc Plated)	2.00
SC-1330-37	33654-DWG	Unitrol HR 3-Axis Assembly	1.00
SC-1330-37	33884-2	1/2 OD Tube Assembly Control Valve Ret	1.00
SC-1330-37	33884-4	1/2 OD Tube Assembly Control Valve Ret	1.00
SC-1330-37	33886-5	1/2 OD Tube Assembly Pressure	1.00
SC-1330-37	33886-6	1/2 OD Tube Assembly Pressure	1.00
SC-1330-37	33887-4	1/2 OD Tube Assembly Return	1.00
SC-1330-37	33887-5	1/2 OD Tube Assembly Return	1.00
SC-1330-37	33891-DWG	Single Stick Control Valve Assembly	1.00
SC-1330-37	34053-1	Locking Knob Upper	1.00
SC-1330-37	34057-1	Locking Knob Tip (Zinc Plated)	1.00
SC-1330-37	34058-1	Locking Handle Sleeve	1.00
SC-1330-37	34059-1	Knob	1.00
SC-1330-37	34059-1	Knob	1.00
SC-1330-37	34060-1	Handle Rod (Zinc Plated)	1.00
SC-1330-37	34071-2	Plastic Dash	1.00
SC-1330-37	34113-2	Control Linkage	1.00
SC-1330-37	34140-DWG	Hr Locking Lever Sub Assembly Drawing	1.00
SC-1330-37	34141-DWG	Hr Locking Lever Assembly Drawing	1.00
SC-1330-37	34163-1	Unitrol 3 Function HR Ctrl Shell	1.00
SC-1330-37	34167-1	Boot 3-Axis Single Stick	1.00
SC-1330-37	34189-1	Handle Rod M8 Threads (Zinc Plated)	1.00
SC-1330-37	34551-1	Rod Cover	1.00
SC-1330-37	34564-DWG	M8 Covered Control Handle Assembly	1.00

## As Built Material List

<u>Option</u>	<u>Part</u>	<u>Description</u>	<u>Qty</u>
SC-1330-37	35482-1	Trigger Plastic	1.00
SC-1330-37	35767-DWG	HR S-STK Cntrls Btwn Bm and Bkt Rev Mt Elevator	1.00
SC-1330-37	35768-1	1/2 OD Tube Assembly	1.00
SC-1330-37	35769-1	1/2 OD Tube Assembly	1.00
SC-1330-37	35770-1	1/2 OD Tube Assembly	1.00
SC-1330-37	35772-1	1/2 OD Tube Assembly	1.00
SC-1330-37	35773-1	1/2 OD Tube Assembly	1.00
SC-1330-37	40002-3	1/4-NC Hex Head Cap Screws 3/4	1.00
SC-1330-37	40003-1	5/16 NC Hex Head Cap Screw	2.00
SC-1330-37	40003-11	5/16 NC Hex Head Cap Screw	2.00
SC-1330-37	40003-18	5/16 NC Hex Head Cap Screw	3.00
SC-1330-37	40004-10	3/8 NC Hex Head Cap Screw	2.00
SC-1330-37	40016-4	1/4-20 NC Nylon Bolt	4.00
SC-1330-37	40070-11	1/4 - NC Socket Head Cap Screw 2 1/2	1.00
SC-1330-37	40070-7	1/4 - NC Socket Head Cap Screw 1 1/2	3.00
SC-1330-37	40116-1	5/16 Dia Shoulder Bolt	2.00
SC-1330-37	40117-1	M5 X 0.8MM Metric Cap Screw	4.00
SC-1330-37	40125-5	5/6NF Socket Head Cap Screw	2.00
SC-1330-37	40171-12	3/8-NC Fiber Flanged HD Cap Screw	4.00
SC-1330-37	42000-1	NC Hex Nuts	6.00
SC-1330-37	42000-3	NC Hex Nuts	3.00
SC-1330-37	42001-1	NF Hex Nuts	5.00
SC-1330-37	42001-2	NF Hex Nuts	2.00
SC-1330-37	42005-1	NC Hex Locknut 1/4	1.00
SC-1330-37	42005-1	NC Hex Locknut 1/4	1.00
SC-1330-37	42005-2	NC Hex Locknut 5/16	7.00
SC-1330-37	42005-3	NC Hex Locknut 3/8	2.00
SC-1330-37	42008-1	Thin NF Hex Nylon Locknut	1.00
SC-1330-37	42014-3	Metric Hex Nut 8mm -1.25mm	1.00
SC-1330-37	42014-3	Metric Hex Nut 8mm -1.25mm	1.00
SC-1330-37	44005-4	Internal Tooth Lockwasher	1.00
SC-1330-37	44013-5	Hardened Washer 5/16 (Plated)	10.00
SC-1330-37	44013-6	Hardened Washer 3/8	5.00
SC-1330-37	44013-7	Hardened Washer 1/4	1.00
SC-1330-37	45002-31	Clevis Pin	2.00
SC-1330-37	45002-37	Clevis Pin	2.00
SC-1330-37	45003-2	Cotter Pins	4.00
SC-1330-37	45008-31	Roll Pin	1.00
SC-1330-37	50004-3	Jic Swivel 90 Elbow	8.00
SC-1330-37	50004-4	JIC Swivel 90 Deg Elbow	1.00
SC-1330-37	50007-7	Male Pipe to Male Pipe Adapter	1.00
SC-1330-37	50009-3	Male SAE O-Ring to Male JIC Adapter	4.00
SC-1330-37	50009-4	Male SAE O-Ring to Male JIC Adapter	2.00
SC-1330-37	50011-4	SAE O-Ring to Male Jic 90 Deg Adjustable Elbow	5.00
SC-1330-37	50011-4	SAE O-Ring to Male Jic 90 Deg Adjustable Elbow	3.00
SC-1330-37	50012-4	High Pressure 90 Elbow Pipe	1.00
SC-1330-37	50036-4	NPT Female Tee with Male NPT on Run	1.00
SC-1330-37	50038-16	Pipe to JIC Nipple	3.00
SC-1330-37	50042-4	NPT Steel Plugs Socket Head	4.00
SC-1330-37	50046-1	Male JIC to Male O-Ring Long Adapter	4.00
SC-1330-37	50048-2	JIC Tee w/Swivel Nut on Run	8.00
SC-1330-37	50048-3	JIC Tee w/Swivel Nut on Run	1.00
SC-1330-37	50048-3	JIC Tee w/Swivel Nut on Run	2.00
SC-1330-37	50074-4	Male SAE O-Ring to Male JIC 45 deg Elbow	1.00
SC-1330-37	50077-4	JIC Tee	2.00

AS BUILT OPTIONS & PARTS INDEX

## As Built Material List

<u>Option</u>	<u>Part</u>	<u>Description</u>	<u>Qty</u>
SC-1330-37	50081-4	SAE O-Ring Plug	1.00
SC-1330-37	50081-4	SAE O-Ring Plug	1.00
SC-1330-37	50101-8	SAE O-Ring to Male JIC 90 Adjustable Elbow	2.00
SC-1330-37	50113-4	Steel Coupling	4.00
SC-1330-37	50113-4	Steel Coupling	1.00
SC-1330-37	50130-4	Male NPT 90 Deg Union	3.00
SC-1330-37	50163-4	Tee (JIC) with O-Ring on Run	1.00
SC-1330-37	50189-1	Vacuum Breaker	8.00
SC-1330-37	50189-3	Vacuum Breaker	1.00
SC-1330-37	50189-3	Vacuum Breaker	1.00
SC-1330-37	54022-19	Control Valve	1.00
SC-1330-37	54027-6	Single Selector Valve	1.00
SC-1330-37	54230-2	Tool Valve	1.00
SC-1330-37	54325-1	Check Valve In-Line 1/2 NPT	1.00
SC-1330-37	54327-1	Single Stick Control Valve	1.00
SC-1330-37	55683-1	Polyurethane Tubing 9/16 OD X 3/8 ID	0.00
SC-1330-37	58082-1	Lever Control Kit	1.00
SC-1330-37	72028-2	Uniball Rod End	1.00
SC-1330-37	72030-2	Rod End Ball Joint	2.00
SC-1330-37	72038-1	Rod End Ball Joint # SPM-4S	2.00
SC-1330-37	72046-1	Rod End Ball Joint	3.00
SC-1330-37	7442-5	Spacer (Stainless Steel)	3.00
SC-1330-37	88000-3	Knob (Red)	1.00
SC-1330-37	88002-1	Compression Spring	1.00
SC-1330-37	89061-1	Adj Yoke End (Plated)	2.00
SD-1200-13	33656-3	Decal Slope Warning	2.00
SD-1200-13	33657-2	Slop Indicator 10 Degree	2.00
SD-1200-13	33658-DWG	Slope Indicator Installation	1.00
SD-1200-22	34174-1	Rubber Boot Air Cylinder	1.00
SD-1200-22	35890-DWG	Boot Air Cylinder	1.00
SK-34	25728-1	Shipping Skid VO-255 Rev Mount	1.00
SK-34	40007-8	5/8 NC Hex Head Cap Screws	2.00
SK-34	40054-9	5/8 NC Hex Head Cap Screws	2.00
SK-34	42005-7	NC Hex Locknut 5/8	2.00
SK-34	44013-1	Hardened Washer 5/8	4.00
SK-34	8273-24	Shipping Anchor Bolt Lock	1.00
TT-1330-1	10226-2	Pivot Spacer	2.00
TT-1330-1	14024-1	Pinion Cover	1.00
TT-1330-1	20570-DWG	Turret Assembly	1.00
TT-1330-1	33788-1	Turret Weldment	1.00
TT-1330-1	40000-23	Socket Head Flat Head Screw	3.00
TT-1330-1	40004-5	3/8 NC Hex Head Cap Screw	4.00
TT-1330-1	40007-5	5/8 NC Hex Head Cap Screws	2.00
TT-1330-1	44013-1	Hardened Washer 5/8	2.00
TT-1330-1	44013-6	Hardened Washer 3/8	4.00
TT-1330-1	5531-2	Pin Washer (Zinc Plated)	2.00
TT-1330-1	8076-10	Pin Assembly	1.00
TT-1330-1	8076-8	Pin Assembly	1.00
UB-1330-2	13517-1	Polyethylene Bolt Cover	1.00
UB-1330-2	22142-1	Cover Elbow	1.00
UB-1330-2	22209-1	Bearing	2.00
UB-1330-2	29532-1	Hose Cover Elbow	1.00
UB-1330-2	29534-1	Cover Inspection (Plastic)	2.00

## As Built Material List

<u>Option</u>	<u>Part</u>	<u>Description</u>	<u>Qty</u>
UB-1330-2	29535-1	Cover Inspection	1.00
UB-1330-2	29536-1	Hose Cover Pf and Side	1.00
UB-1330-2	32794-2	Upper Boom Final Weldment VO260-01 Reverse Mount	1.00
UB-1330-2	32798-DWG	Upper Boom Assembly VO255/260-01/02	1.00
UB-1330-2	32799-1	Boom Tip Cover	1.00
UB-1330-2	40002-5	1/4-NC Hex Head Cap Screws 1"	2.00
UB-1330-2	40002-6	1/4-NC Hex Head Cap Screws 1 1/4	1.00
UB-1330-2	40076-12	5/16-18 Taptite Screw 3/4"	20.00
UB-1330-2	40182-1	10-24 NC Nylon Hex Head Machine Screw	4.00
UB-1330-2	42005-1	NC Hex Locknut 1/4	3.00
UB-1330-2	44013-7	Hardened Washer 1/4	6.00
UB-1330-2	650990-48	Clamp Steel Cush Loop	3.00
UB-1330-2	8526-6	Bearing	1.00
VO270EREV	33996-DWG	VO265E/270E Base Bill	1.00
VO270EREV	PAINT	STD Versalift White Paint	4.00
VO270EREV	PRIMER-PAINT	PRIMER PAINT	3.00
<b>SubAssembly Kits</b>			
39025-02	Paper	PAPER 8-1/2x11 FOR MANUALS	180.00
E-1330-3	10143-12	Pin Assembly 12612-7	14.00
E-1330-3	10226-23	Pivot Spacer	12.00
E-1330-3	152-015	Rego Check Valve	1.00
E-1330-3	22135-13	Washer Special (Zinc Plated)	8.00
E-1330-3	33831-1	Pin Elevator Pivot (Chrome Plated)	4.00
E-1330-3	33832-1	Compensation Link Weldment	4.00
E-1330-3	33837-1	Link Equalizer	1.00
E-1330-3	33839-1	Knuckle Weldment	1.00
E-1330-3	33841-1	Lower Arm Weldment	1.00
E-1330-3	33842-1	Upper Arm Weldment	1.00
E-1330-3	33855-DWG	Knuckle Assembly w/Bearings	1.00
E-1330-3	33857-DWG	Pedestal Assembly w/Bearings	1.00
E-1330-3	33858-DWG	Lower Arm Assembly w/Bearings	1.00
E-1330-3	33859-DWG	Upper Arm Assembly w/Bearings	1.00
E-1330-3	33860-DWG	Equalizer Link Assembly w/Bearings	1.00
E-1330-3	34270-1	Pedestal Weldment	1.00
E-1330-3	34359-1	Pedestal Cover (Plastic)	3.00
E-1330-3	35867-1	Base/Outrigger Weldment	1.00
E-1330-3	35868-DWG	Base/Outrigger w/Bearings	1.00
E-1330-3	35869-DWG	Longitudinal Elev Assy (Asplundh)	1.00
E-1330-3	35869-DWG	Longitudinal Elev Assy (Asplundh)	1.00
E-1330-3	40004-3	3/8 NC Hex Head Cap Screw	28.00
E-1330-3	40006-5	1/2-NC Head Cap Screw	14.00
E-1330-3	40177-1	Wing Screw 5/16-18NC	12.00
E-1330-3	44013-3	Hardened Washer 1/2	14.00
E-1330-3	44013-6	Hardened Washer 3/8	28.00
E-1330-3	48014-62	5100 Retainer Rings	16.00
E-1330-3	53031-1	Cylinder Assembly Elevator	2.00
Lot No. 1134-100029377			
E-1330-3	54070-1	Check Valve	1.00
E-1330-3	7766-1	Pin Washer (Zinc Plated)	14.00
E-1330-3	8441-7	Bearing	2.00
E-1330-3	8441-7	Bearing	4.00
E-1330-3	8441-7	Bearing	2.00
E-1330-3	8441-7	Bearing	4.00

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## As Built Material List

<u>Option</u>	<u>Part</u>	<u>Description</u>	<u>Qty</u>
E-1330-3	8441-7	Bearing	4.00
E-1330-3	8527-2	Bearing	2.00
E-1330-3	8527-9	Bearing	4.00
E-1330-3	8527-9	Bearing	2.00
E-1330-3	8527-9	Bearing	2.00
E-1330-3	89225-1	Plug Rectangular Tube	8.00
FB-60	12803-1	Shim	4.00
FB-60	40006-11	1/2-NC Head Cap Screw	4.00
FB-60	42005-5	NC Hex Locknut 1/2	4.00
FB-60	44013-3	Hardened Washer 1/2	8.00
FB-60	8817-5	Platform 39 One Man	1.00
HK-1330-18	3281-57	3/8 Hose Assembly	2.00
HK-1330-18	3281-58	3/8 Hose Assembly	2.00
HK-1330-18	33878-DWG	Elevator Hose Kit VO265E/270E	1.00
HK-1330-18	55678-1	1/4 Hose Assembly	8.00
HK-1330-18	5960-28	1/2 Hose Assembly	3.00
HK-1330-18	89088-28	Hose Protective Cover	1.00
HK-1330-18	89088-29	Hose Protective Cover	1.00
HK-1330-18	89164-10	Hose Protective Cover	1.00
MH-1330-10	35874-DWG	Elevator Mtg Hrdwr (Asplundh)	1.00
MH-1330-10	40054-11	5/8 NC Hex Head Cap Screws	20.00
MH-1330-10	42027-7	Prevailing Torque NC Hex Locknut Grd C	20.00
MH-1330-10	44013-1	Hardened Washer 5/8	40.00
OR-1400-49	12196-1	Outrigger Slide Pad	2.00
OR-1400-49	12213-1	Outrigger Cylinder Assembly	2.00
OR-1400-49	14284-2	Inner Leg (Batch Weld)	2.00
OR-1400-49	18935-1	Cover Rear Mount Outrigger	1.00
OR-1400-49	35870-DWG	Outrigger Assembly (Pivot Foot)	1.00
OR-1400-49	40004-3	3/8 NC Hex Head Cap Screw	2.00
OR-1400-49	44013-6	Hardened Washer 3/8	4.00
OR-1400-49	45008-23	Roll Pin	2.00
OR-1400-49	48000-12	Snap Ring Walde	4.00
OR-1400-49	50011-3	SAE O-Ring to Male Jic 90 Deg Adjustable Elbow	4.00
OR-1400-49	50045-3	JIC Cap	4.00
OR-1400-49	5487-3	Pin Cylinder Outrigger	2.00
OR-1400-49	8267-1	Pivot Foot (Batch Weld)	2.00
OR-1400-9	20080-DWG	Outrigger Pin Option	1.00
OR-1400-9	8764-2	Pin Outrigger Cyl (Base End) (Chrome Plated)	2.00
RO-1330-2	12478-1	Gearbox Spacer	2.00
RO-1330-2	12518-1	Brace Drive Strap	1.00
RO-1330-2	12519-1	Drive Strap (Batch Weld)	1.00
RO-1330-2	12524-1	Rotary Joint (13-Pass)	1.00
RO-1330-2	12593-1	Dual C'Balance Valve Assy	1.00
RO-1330-2	12739-1	Plastic Shim	1.00
RO-1330-2	15035-1	Rotary Joint Mount Plate (Zinc Plated)	1.00
RO-1330-2	32763-DWG	Rotation Gearbox Assembly	1.00
RO-1330-2	33880-DWG	Sub Assembly Rotary Joint 13 Pass	1.00
RO-1330-2	33881-DWG	Continuous Rotation Assy Elevator	1.00
RO-1330-2	40003-5	5/16 NC Hex Head Cap Screw	2.00
RO-1330-2	40003-5	5/16 NC Hex Head Cap Screw	4.00
RO-1330-2	40004-7	3/8 NC Hex Head Cap Screw	3.00
RO-1330-2	40006-7	1/2-NC Head Cap Screw	2.00
RO-1330-2	40006-9	1/2-NC Head Cap Screw	2.00

## As Built Material List

<u>Option</u>	<u>Part</u>	<u>Description</u>	<u>Qty</u>
RO-1330-2	40033-13	5/16 NC Socket Head Cap Screw	4.00
RO-1330-2	40054-10	5/8 NC Hex Head Cap Screws	18.00
RO-1330-2	40076-12	5/16-18 Taptite Screw 3/4"	2.00
RO-1330-2	40077-15	5/8 NC Socket Head Cap Screw	4.00
RO-1330-2	42027-7	Prevailing Torque NC Hex Locknut Grd C	4.00
RO-1330-2	44000-10	Helical Spring Lock Washers	2.00
RO-1330-2	44000-10	Helical Spring Lock Washers	4.00
RO-1330-2	44000-11	Helical Spring Lock Washers	3.00
RO-1330-2	44000-13	Helical Spring Lock Washers	2.00
RO-1330-2	44013-1	Hardened Washer 5/8	22.00
RO-1330-2	44013-3	Hardened Washer 1/2	2.00
RO-1330-2	50000-3	1/8 Std Galv Steel Nipples	2.00
RO-1330-2	50004-3	Jic Swivel 90 Elbow	2.00
RO-1330-2	50004-3	Jic Swivel 90 Elbow	4.00
RO-1330-2	50009-20	Male SAE O-Ring to Male JIC Adapter	8.00
RO-1330-2	50009-3	Male SAE O-Ring to Male JIC Adapter	2.00
RO-1330-2	50011-25	SAE O-Ring to Male Jic 90 Deg Adjustable Elbow	8.00
RO-1330-2	50011-4	SAE O-Ring to Male Jic 90 Deg Adjustable Elbow	3.00
RO-1330-2	50012-1	High Pressure 90 Elbow Pipe	2.00
RO-1330-2	50046-2	Male JIC to Male O-Ring Long Adapter	3.00
RO-1330-2	50048-2	JIC Tee w/Swivel Nut on Run	4.00
RO-1330-2	50048-2	JIC Tee w/Swivel Nut on Run	2.00
RO-1330-2	50081-1	SAE O-Ring Plug	4.00
RO-1330-2	50113-1	Steel Coupling	2.00
RO-1330-2	56000-3	Hydraulic Motor	1.00
RO-1330-2	72020-2	Rotation Bearing	1.00
RO-1330-2	73020-2	Gearbox Assembly Nodular Iron	1.00
Lot No. 2396-100038543			
RO-1330-2	80000-1	Knob	1.00
RO-1330-2	80008-10	Greasfitting Lincoln 5200	2.00
RO-1330-2	8181-1	Eccentric Ring (Zinc Plated)	1.00
SK-1330-4	35863-1	Skid Weldment	1.00
SK-1330-4	35872-DWG	Shipping Skid Installation	1.00
SK-1330-4	40007-10	5/8 NC Hex Head Cap Screws	4.00
SK-1330-4	42005-7	NC Hex Locknut 5/8	4.00
SK-1330-4	44013-1	Hardened Washer 5/8	8.00
VK-1400-21	20620-DWG	Outrigger Cntrl Valve Kit with Relief	1.00
VK-1400-21	54022-15	Control Valve	1.00

AS BUILT OPTIONS & PARTS INDEX

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